SOIL CONSERVATION

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SOIL CONSERVATION

Index

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August 1961 to July 1962

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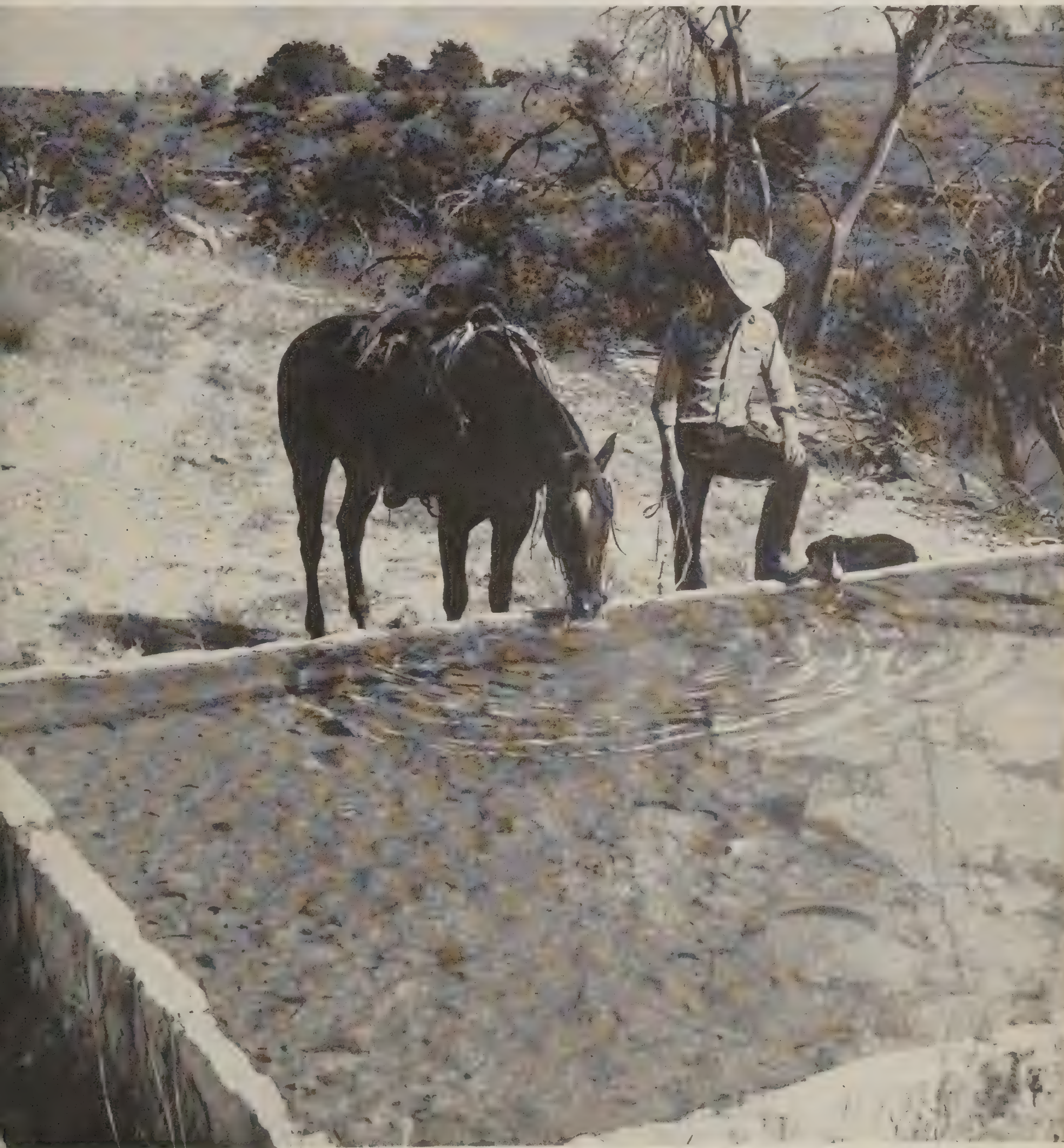

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

"Our Nation has been blessed with a bountiful supply of water; but it is not a blessing we can regard with complacency."

—JOHN F. KENNEDY

COVER PICTURE.—Springs have been an important source of stockwater in the West ever since stockmen trailed their first herds across the Great Plains. This is a typical present-day conservation spring development, on the Ulrich ranch near Johnson City, Tex.

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Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

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FRANK B. HARPER, Editor

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Water Conservation

By Donald A. Williams

WATER commands the attention of resource conservationists today as never before. Iounting demands all over the ountry force communities and inustries to seek new water sources.)roughts and floods create local mergencies.

The public is aroused to water roblems in the nineteen-sixties uch as it was to the menace of soil rosion in the thirties.

Water conservation is a major esponsibility of the Soil Conseration Service. From the begining, water conservation has been ssociated with soil conservation. 'he basic Soil Conservation Act of 935 (Public Law 46) recognized 'the wastage of soil *and moisture* esources'' and provided ''for the ontrol and prevention of soil eroion and thereby to preserve naturl resources, control floods, preent impairment of reservoirs, and naintain the navigability of rivers nd harbors . . .''

Although the primary attention f the Service, and of soil conseration districts, in the early years vas directed at erosion control, its rogram has expanded to include broad range of soil and water nanagement activities. Many soil onservation districts are revising heir programs, too, and even hanging their names, to show their rowing concern with water conervation. Water management in onjunction with soil and cover nanagement is the primary purose of small-watershed projects.

Water conservation takes many orms, but everywhere it is basic to onserving soil. It begins with holding water on and in the soil in accordance with the natural capabilities of the land, then disposing in orderly fashion of any excess water into natural channels.

''Banking'' water in the soil for later use by crops is fundamental to conservation accomplishment in many areas of the country. In others the primary consideration is managing the land and its cover to avoid wasteful consumptive uses or evaporation losses in water-producing areas. Efficient and beneficial use of water on irrigated land through proper control of moisture in relation to soils and plants is water conservation also.

In all these circumstances, soil conservation and water conservation are intimately interrelated. And water conservation, like soil conservation, requires a combination of technologies to cope with the peculiar problems of each situation.

Such maladjustments as too little water or too much, water at the wrong time or wrong place, and such questions as how much there is likely to be and to whom it belongs—these and others, ad infinitum, must be dealt with day by day by trained conservationists in the localities where they occur.

The Soil Conservation Service deals with these matters as a regular part of its operations on the land. From the snow surveys in the high mountains to water control programs in the coastal plains and river deltas, the SCS helps landowners and water users make efficient use of the available supply under prevailing local conditions. In every part of the country, soil surveys provide fundamental information for managing moisture in the soil and for planning water-control structures. SCS hydrologists, conservation engineers, and other specialists help design irrigation systems, floodwater-retarding dams, ponds and reservoirs, and many other water conservation measures.

While the country is in no imminent danger of running out of water, it simply is no longer in the enviable position of having enough water at all times for all uses at all locations. In many places there must be choices among alternative uses for the available supply. Economic developments in many cases will have to go where the required water is. On a national scale, we shall have to take effective action to regulate and stabilize streamflow, to develop water resources, and to protect them from pollution and sedimentation.

Teamwork and cooperative effort of local, State, and Federal interests have pointed the way in soil conservation. Water problems will be solved by the same kind of joint effort. Tremendous progress already is being made in soil conservation districts and watershed projects across the country.

Everywhere, farmers, ranchers, and town and city people in business and industry—in fact, everyone who uses water in any way—are affected by what the Soil Conservation Service is doing to conserve soil and water. Our role is fundamental, for it approaches water conservation on the basic relationship of land, water, and people.

One Drop of Water Does Work of Two

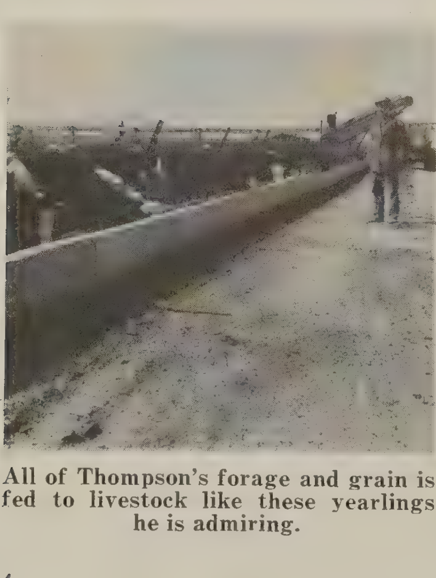
By R. S. Swenson

MAKING one drop of water do the work of two is a must for farmers in the Eloy and Seven-Eight soil conservation districts of southern Arizona.

A part of the great Sonoran Desert, the districts are in the lower Santa Cruz Valley between Tucson and Casa Grande. Rainfall averages about 8 inches a year, falling mostly as severe downpours during July and August or as more gentle rains in December and January.

Little of the rainfall has any value for growing crops. Farmers have to depend entirely on deep, drilled wells for irrigation water, except for a few who pick up surface water from the Santa Cruz River, normally a dry stream. Some wells are 2,000 feet deep or deeper, with an average pump lift of nearly 400 feet. Water levels have been dropping steadily each year.

Cotton is the main crop in the area, being one of the few crops that can be grown at a profit today. Other crops include alfalfa, sorghum, barley, wheat, and vegetables. The average cotton yield for 1957 was 2.4 bales an acre, and slightly less than that over the 5 years to 1960.



All of Thompson's forage and grain is fed to livestock like these yearlings he is admiring.

One of the big problems is the declining water supply. A combination of an annually lower water table from pumping and a decreased yield of water from the wells has left farmers with about 50 percent as much water as they had in 1949. They long have recognized the need for using soil and water conservation practices if they are to stay in business.

In 1945 and 1949, farmers in two adjacent areas organized the Seven-Eight and Eloy soil conservation districts, enabling them to get help with their conservation problems from the Soil Conservation Service and other agencies. Since the districts were organized, 26,377 acres of land have been leveled to desirable irrigation grade, and 244 miles of concrete-lined ditches have been installed on cooperators' farms with SCS technical assistance. Land leveling and ditch lining are two practices that show the most dramatic effect in saving water.

Typical of these farmers is Phil Thompson, who farms 1,620 acres of rich, loamy soil in the Redrock area. He has beeen a cooperator since the Eloy district was organized.

"We had to use water-saving practices or quit farming," Thompson said. "By leveling to a good grade, and according to soil type, and by lining ditches, we can double the acres of land we can farm with a given amount of water."

Thompson is a believer in planning his work and working his plan. Soon after becoming a district cooperator, he worked out a complete farm conservation plan with the help of technicians from the Eloy SCS office. His original plan, revised in 1955, called for reorganizing the size and shape of the fields, and for reducing their number from 15 to 9. He also planned to level each field and line all head ditches with concrete.

Thompson checks soil moisture with a soil tube before pre-irrigating for cotton.

He has kept his plan right on schedule, and planned to revise and improve it further upon its completion.

He had leveled 1,237 acres by mid-1961, moving a total of 413,787 cubic yards of earth, and had installed 8 miles of concrete ditches. Grades in the direction of run on leveled fields vary from 3 inches to 100 feet of row to $\frac{6}{10}$ inch to 100 feet. On some fields the last 300 feet of run is flat, to eliminate running tail water off the field.

Thompson uses his own equipment for land leveling. He has two rigs, a crawler tractor with scraper, and a large wheel tractor with scraper. He does most of his land

Note:—The author is work unit conservationist, Soil Conservation Service, Eloy, Ariz.

eveling during slack times, when tractors and men are not needed for other work on the farm. However, if he has a big job under way, he may keep at least one rig going even during rush seasons.

Thompson knows his water conservation practices would lose part of their effectiveness unless he also uses sound management practices on the land. His rotation varies somewhat, but is basically a 6-year rotation of 3 years of alfalfa, 2 years of cotton, and 1 year of small grain or sorghum. He says his cotton yields increased steadily from 1949 to 1957. The yields were ''off somewhat in 1958 and 1959, but those were bad cotton years for everybody.''

He returns as much organic matter to the soil as possible. All crop residues are returned to the soil. In addition, manure from about 1,500 head of steers fed in dry lot each year is spread on the fields. He also uses sound soil management practices. The soil is worked as little as possible, to reduce puddling and compaction. A subsoiler is used after leveling, and at other times when it is necessary to break up any plowpans that may develop.

Before planting, Thompson preirrigates to a depth of 4 to 5 feet, and tries to replace only the moisture removed by the plants during subsequent irrigations. He uses a soil tube or probe to check the depth and rate of penetration of water during irrigation.

Soil and water conservation go hand in hand in the entire Santa Cruz Valley area. Land leveling, ditch lining, conservation crop rotations, subsoiling, returning crop residues to the soil, contour irrigation, green manures, barnyard manures, and minimum tillage are practices used by nearly all farmers to get more efficient use of water and keep the soil where it belongs.

Thompson hires commercial specialist to spread barnyard manure.

Slack-season land leveling to desirable irrigation grade on the Phil Thompson farm.

Chemicals Slow Evaporation

A mixture of hexadecanol and octodecanol has been shown to be effective in reducing evaporation losses from surface-stored water. Evaporation, the biggest single surface water loss in ponds, reservoirs, and lakes, may take up as much as 50 percent of the total water impounded during dry periods.

Formed from animal, vegetable, and marine oils, these chemicals are odorless, tasteless, and nontoxic to plant and animal life. They spread rapidly on water surfaces and form an invisible film one molecule thick.

These films were tested at the Texas Experimental Ranch in Throckmorton County during 1959 and 1960, in specially built twin ponds. In the 1959 tests, no decrease in evaporation resulted from applying the material in solid form, but the liquid form reduced evaporation an average of 17 percent. During periods of low wind velocity, daily savings of more than 25 percent occurred.

Liquid application has its drawbacks, however. If water should get into the application apparatus, or if the temperature should drop too low, liquid hexadecanol will crystallize. Further tests are being made to improve application methods and obtain more efficient distribution of the chemicals.

◆

On the Indiana State House grounds grows a red oak tree in a unique soil mixture—soil from the 400 farms of the supervisors of Indiana's 81 soil conservation districts. At the 1959 annual meeting of the State Association of SCD Supervisors, each district supervisor brought a sample of soil from his farm. The samples were mixed together, and on Arbor Day, April 14, 1960, the tree was planted in this mixture at a special dedication ceremony.

Water Conservation

A Key to South Dakota Progress

By Steve Kortan

WATER is big business in South Dakota. Our agriculture is keyed directly to the supply of water available for rapidly expanding irrigation, for ranching, and for dryland farming.

In some areas of South Dakota we do not have as much good water as we need for farming and other purposes. Some of our towns and cities seldom have a large enough supply in sight to relax their accustomed vigilance in its use.

The widening use of irrigation, coupled with conservation water management, is doing much to stabilize the farm output in South Dakota, with a steadying effect on the State's economy. Still, only 3 percent of South Dakota's farmlands are irrigated. A tremendous potential in our agricultural development lies not only in getting irrigation water to crops, but also in making efficient use of the moisture that is available to the rest of our crop and range lands.

Our precipitation ranges from an average of about 20 inches a year on the eastern side of the State to about 14 inches in the west. Unless effective water conservation measures are used, dryland farming stands to suffer accordingly in most years.

Out of a total of, say, some 18 inches of rain and snowfall on our croplands, only 3 to 4 inches of moisture is available for actual use by the dryland crops. The rest is lost through evaporation and runoff. About one-third of the rainfall comes as light showers which, because of high evaporation losses, are not effective in providing plant moisture. This and other evaporation losses account for about two-thirds of the precipitation.

A big opportunity in South Dakota agriculture clearly lies in the conservation of the nearly 80 percent of the rain and snow water not used by vegetation. South Dakota soil provides a tremendous reservoir for moisture. Experience of our farmers and ranchers over a half-century, and painstaking research by conservationists and other scientists have pointed the way to far more efficient use of moisture.

On our non-irrigated lands, the opportunity to do so lies in the use of those practices which (a) increase the intake rate of water by the soil, (b) store water by detention, and (c) tend to reduce the rate of evaporation.

Take terracing, one of our important water-conserving practices. We know from careful studies that this practice alone, on the basis of the storage of one additional inch of moisture, over the years can be worth approximately $4 an acre to the farmer growing flax, wheat, or soybeans, more than $5 an acre in the case of alfalfa, and $8 in the case of corn. This takes into account an average cost of terracing of $225 a mile, plus maintenance. Around 800,000 acres of cropland

Note:—The author is State conservationist, Soil Conservation Service, Huron, S. Dak.

Conservation irrigation like this in Potter County, S. Dak., makes the best use of available water.

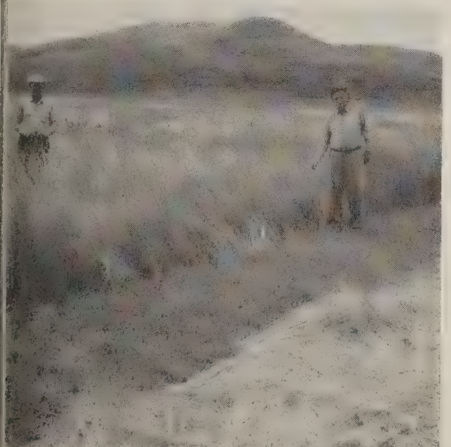
may be terraced profitably in South Dakota.

We also know that contour cultivation, which can be done for about $2 an acre, will store an additional acre-foot of water at a cost of about $14.50. Stubble-mulch tillage also belongs well up in the category of moisture-saving practices in importance. Stubble to trap additional moisture to improve the rate of moisture intake, to condition the soil for more efficient use of moisture, and to reduce evaporation is a tool the up-to-date South Dakota farmer is making sure is a part of his conservation kit.

There are other practices, of course, such as waterspreading, tree windbreaks, and the use of cover and soil-improving crops, which dovetail into this moisture-conserving group. On rangelands, the principles of proper use similarly are tied in closely with the maximum use of rain and snowfall.

Conservation grass management pays off for Raymond Sutton of Onida, S. Dak., in more pounds of beef to the acre.

Level terraces hold water for crop use on the Delmar W. Goddard farm near Onida, S. Dak.



Hay produced as a result of waterspreading with a terrace system on the Leo DeJong ranch in Tripp County, S. Dak.

Added to these considerations are those involving the protection of our soil against erosion. Unrestrained by conservation practices, erosion takes its toll year by year in both soil and farm income.

The value to our agriculture and our economy of such water developments as the present Oahe Dam project on the Missouri River in central South Dakota is not to be underestimated. It is planned that Oahe waters alone will irrigate nearly half a million acres.

In irrigation farming, too, conservation management of water for top efficiency in its use is essential. This means using measures to prevent seepage and evaporation in the delivery of water to the land, the preparation of field surfaces to allow uniform water levels, and use of the best in farming practices to keep the soil in its most productive condition.

Experience has demonstrated that failure to use conservation measures in irrigation farming, on the other hand, means climbing costs, waste in water and soil, and declining yields. It means that an acre-foot of water stored in an Oahe will accomplish only half or less than its potential by the time its job is done.

Meanwhile, with modern technological and other conservation facilities available, farming areas outside the scope of such major irrigation projects need not remain static. A smaller per-acre investment in the known and tested practices in soil and moisture conservation will yield impressive returns. Soil conservation districts' programs and the Great Plains Conservation Program are geared to development of this potential; and cost sharing offered in the latter program and in the Agricultural Conservation Program makes it easier for landowners in non-irrigated areas to round out South Dakota's yet-to-be-completed progress story in stable and profitable soil and water conservation farming and ranching.

◆

Reports from 269 counties in the Great Plains showed that about 1,151,000 acres had been damaged by wind action as of April 1, 24 percent less than a year earlier.

◆

An estimated 65 to 70 percent of the water now being diverted from streams for irrigation is actually lost to U.S. farmers.

75,000 Minnows An Acre

By James R. Cox

Two of the Garners' 35 minnow ponds.

A seine full of shiners to be graded.

Restocking refilled pond for next year's production.

Plant where minnows are sized and held for shipment.

LUTHER, Hugh, and Clyde Garner have made a profitable business out of raising "golden shiner" minnows in ponds developed on their farm in the Dallas County Soil Conservation District in southern Arkansas. They raise from 60,000 to 75,000 golden shiners an acre in an area where the average yield of cotton is only about half a bale to the acre.

Good management and scientific knowledge are musts for raising shiners successfully. So is a good market. The Garner brothers sell brood shiners as well as all sizes for fishermen.

The Garners built their first pond 12 years ago. They now have 35 holding and rearing ponds. Their water supply is a small, spring-fed creek that meanders across their farm.

Each winter, the ponds are drained, refilled, and restocked for the next year's production. The water is pumped into the ponds in the winter, when danger of contamination from fish eggs and small predatory fish is low.

Water is never wasted when a pond is drained; it is used to fill another pond that has been proper-

Note:—The author is work unit conservationist, Soil Conservation Service, Fordyce, Ark.

ly stocked. All the ponds are deep enough to take care of evaporation in hot weather. They are fertilized regularly in warm weather, and the minnows are fed daily the year around.

Disease and predatory fish and animals usually are among the hazards of raising minnows; but so far the Garner brothers have been able to control them. In fact, they have never been troubled by any of the common parasites found on shiners.

A plant the Garners built for grading the shiners includes metal vats that can hold a quarter of a million minnows for shipment.

Man K.O.'s Gully in Three Rounds

By George R. Smith and Grant Woodward

THIS is a blow-by-blow account of Leroy Marti's bout with a tenacious gully.

Marti and the gully practically grew up together, but he never felt that it had any right to be on the farm. The gully was born sometime after Marti's grandfather bought the place near Bern, Kans., in what is now the Nemaha Soil Conservation District. It started from a trail made by the cattle as they traveled from the barn across the railroad to the main part of the farm. It grew slowly at first; but as the adjoining grassland was plowed up and increased runoff water fed it, the gully's growth was faster with each rain.

When Marti and his wife, Mavis, bought the farm a few years ago, the gully had grown to be some 10 feet deep, and was a bully type that promised stiff opposition. Stiffer opposition, however, was what Marti had in mind. He and Mavis held a pre-fight conference to plan the attack. The farm buildings were begging for their limited money to be spent on them, but the Martis knew they had to whip the gully first. As Leroy put it, "You can always build buildings, but if you let your soil get away you are whipped."

They decided they needed a trainer; so they took the matter up with the Nemaha district supervisors. The result was a complete farm plan which Marti developed with the help of Soil Conservation Service technicians. The plan called for giving Mr. Gully his come-uppance.

A local contractor took the gully's measure and went to work with heavy equipment. But nature swung with an untimely assist on the gully's side. No sooner had it been shaped into seeming submission, seeded to bromegrass and redtop, and nearly counted out, than unusually heavy rain fell. Between 21 and 23 inches of rain belted the farm that August. When the rain stopped, the gully was revived to about where it was when the bout started. Round one went to the gully.

"Champ" Leroy Marti and Mrs. Marti.

Marti came back fighting. He gave the revitalized gully a thorough working over. He reshaped the waterway, and this time the bromegrass, helped by barnyard manure and commercial fertilizer, took over. All of the fight seemed to be gone from the gully as it became a 1,700-foot long waterway of gently sloping grassland, ready to make its own contribution in hay and grazing. Round two went to Marti.

Marti then was ready to terrace his cropland. The waterway by that time, he figured, could take care of any excess runoff. He finished the terrace system in 1957. The gully, however, still had fight. It took on new life beyond the farm boundary and began inching back past the fence line and into the "ring" again with Marti.

"It was growing at about 30 feet a year," Marti recalls.

An erosion-control dam then went into his conservation strategy. Marti himself operated a tractor as an employee of the contracting firm building the dam. There was satisfaction in helping to mold the structure according to the SCS engineers' design. It also was an extra punch at Marti's old foe, the gully.

The dam is about 50 feet inside the Marti property line. It has a pipe "riser" as a principal spillway, and a grass-protected emergency spillway. The principal spillway is 24 inches in diameter, large enough to handle the excess produced by the kind of storm expected about once in 5 years. The emergency spillway is designed for a 25-year frequency storm flow.

Note:—The authors are, respectively, State engineer, Salina, Kans., and engineer, Lincoln, Nebr., both of the Soil Conservation Service.

The erosion-control dam with which Marti finally knocked out the gully.

That third round, which went to Marti, seems to have been the decisive one.

Marti agrees it was quite a battle—but worth it. He has mastered erosion on the place. Farming is easier and a surer business. Marti's land now can make efficient use of whatever moisture he gets—whether too much, just enough, or less. Marti also has started catching some fish, as a satisfying added payoff from the water behind the erosion-control dam.

Owner Leroy Marti and SCS Engineer Clint Johnson examine fine grassed waterway that replaced the big gully.

Sprinklers More Efficient

Irrigation studies at the North Platte Experiment Station in Nebraska show sprinklers to be 15 percent more efficient in water use than gravity irrigation under controlled conditions.

The outstanding feature of a sprinkler system is better control of the amount and rate of water application. Other advantages include: Water can be applied more easily without eroding soil, allowing safe irrigation of sloping lands; water is applied uniformly on all types of soil, even those with high intake rates; less water is used, since deep percolation is reduced; no land grading is needed; more field area can be cropped—fewer field ditches and weeds; and leaching of fertilizers is lessened.

Automation has reduced much of the labor involved in using a sprinkler system.

◆

Farmers can save both labor and money by running their irrigation water through a screen to catch weed seeds. The seeds travel by water and will germinate after being in water for months or even years. Screening the water keeps weeds and trash out of supply ditches and cuts down the spread of weed seed on cropland, and delays the need for chemical weed control on new land. It also prevents trash from clogging siphons, spiles, pipeline valves, and sprinkler nozzles.

◆

Natural underground reservoirs in the United States store more water than all surface reservoirs and lakes, including the Great Lakes.

◆

Irrigation of farm crops takes about half of the fresh water used in the United States.

Problem Waste Water Turned Into Asset

By Oliver D. Jeffords

MANY an old irrigator has said, "I'm going to use that water till it wears out." That in effect is just what the Broadview Farming Company is doing on its mint lands north of Sunnyside, Wash., in the Roza Soil Conservation District.

Empty reservoir after wintertime removal of silt; pumping station in center and dam and mint still at left.

Broadview's circulating irrigation system, planned with the help of Soil Conservation Service technicians, came about from the practical necessity of putting available water to better use. More irrigation water could have been purchased, but the laterals didn't have the capacity to carry extra water to the fields fast enough. The limited-depth soils of the area dry out quickly and require light but frequent water application for the shallow-rooted mint crop.

It was found that a major part of the land could be made to drain into a gulch where a dam and pond already had been built. The pond provided water close at hand, but was below the irrigation pipelines already in use. The answer was to pump water from the pond through pipe connected with the irrigation pipelines, the pond acting as a settling or desilting basin.

Company land lies above the Roza gravity canal. Water is pumped first by the Roza Irrigation District and carried by a gravity lateral to Broadview's delivery boxes. It then is transported to the fields in a completely piped system, and continues down the individual mint furrows.

Tail water from the ends of the furrows flows in grade ditches to the 10½-acre-foot waste-collection pond. From the pond, water is pumped uphill again and returned through the pipelines serving as field headings, thus completing its closed circuit within the farm boundaries. Silt is removed from the pond during the winter months and hauled to nearby fields.

This repumping of irrigation water has proved to be a real conservation measure for the company. Water is better applied and adjusted to crop requirements, resulting in a more uniform crop. Soil and fertilizer are reclaimed and losses kept to a minimum. The system also does away with extensive drainage improvements or waste-water disposal off the farm, while offering protection to the adjacent, lower-lying lands.

"Re-using irrigation water turns a problem into an asset," Manager Carl Dunning said, "but there's a price tag to it."

He was referring to the $16 an acre it costs the company for an estimated 2 acre-feet of re-used water, compared to the current basic water cost of the Roza Irrigation Project of $10 for 3 acre-feet. Whether it pays to use waste water for irrigation within an irrigation project depends upon site conditions, crop returns, labor saved, and property valuation, factors that were carefully analyzed before deciding to go ahead with the Broadview system.

Reservoir which stores waste water for re-use on these Broadview Farming Co. mint fields and by the mint still.

Note:—The author is engineer, Soil Conservation Service, Sunnyside, Wash.

Don't Pass Up a Good Bet

Harvest Those Grass Waterways

By Tom D. Dicken

KANSAS farmers who are not cutting hay from their grassed waterways perhaps can take a profitable tip from a growing number who are. The latter say they can't afford to pass up the chance to bale fine milk-, beef-, and mutton-producing feed from their waterway acres. Also, experience indicates that where tall and medium grasses are grown in the waterways, removal of the growth once a year is needed to permit proper water flow from terraces or other areas served.

Take Orville Haury, former chairman of the Harvey County Soil Conservation District board, who started his waterways in 1949. He has increased his plantings to 12 acres of bromegrass waterways. Haury has harvested a seed or hay crop from them every year except two. The hay yields run from one to two tons an acre.

Haury has found it pays to apply 30 to 40 pounds of available nitrogen when waterway plantings are harvested for hay or seed. He gets hay approaching alfalfa in feeding value. He uses the hay in feeding his calves and in the ration for steers on full feed.

"I don't see why more farmers don't harvest their brome waterways," Haury says. "Anyone in the livestock business can always use hay. I doubt if over 10 percent of the waterways are cut in this county."

After 11 years, Haury's waterways show no evidence of silting or erosion, proof that harvesting grass from waterways is good for the waterways as well as profitable for the farmer.

Note:—The author is area conservationist, Soil Conservation Service, Hutchinson, Kans.

Waldo Rempel raking waterway bromegrass for baling.

Waldo Rempel, Arthur Unruh, and Paul G. Regier, close neighbors farming southeast of Newton, all have brome waterways which they harvest regularly, primarily for hay. They have completed most of their planned conservation practices, and all have received the Harvey County Bankers Award for conservation.

Regier has harvested his waterways 6 out of the 7 years since they were established. From 3 acres, he has baled between 2 and 2½ tons of hay an acre each year. He fertilizes with 100 pounds of 33-percent nitrogen every other year, and usually puts on barnyard manure in alternate years. He has found the bromegrass hay to be a palatable and nutritious cattle feed, ranking it between prairie and alfalfa hay in feeding value. But, Regier cautions, "Bromegrass hay should be well cured before baling. I believe this is the secret, along with early cutting, to getting good hay."

Unruh regularly cuts hay from his waterway. Average yield has been about two tons of good-quality hay an acre.

"I particularly like to use this hay to start feeding calves in the fall," he says. "It is better hay, cattle like it better than prairie hay, and it does not create the digestive disturbance alfalfa sometimes does."

He also finds that the brome responds profitably to nitrogen fertilizers.

"Before establishing my north

Junior Snell (on tractor) baling native grass on Ross Ray's waterway.

waterway, there was a ditch which couldn't be crossed with machinery,'' Unruh added with respect to benefits. ''Now the area is producing like the rest of the farm; and, in addition, it has enabled me to apply the needed conservation measures to the rest of the land to protect it from erosion.''

Mr. Rempel, an active Harvey County district supervisor, has been harvesting hay or seed since his waterways were established in 1952. He considers them a productive part of his farm—''just like any other acre.''

''The only thing wrong with waterways and terraces is that they are being established too late,'' he says. ''They should have been installed when our forefathers broke this land from grass in the 1870's.''

Several farmers in Reno County likewise have cut their waterways regularly for hay. Because bromegrass is not adapted to their soil and moisture conditions, native grasses such as switch, Indian, buffalo, little bluestem, and blue grama make up most of the grass cover. Yields have varied from 1 to 2 tons to the acre, depending upon the soil and rainfall.

Ross Ray has harvested hay from his 4 acres of waterways every year except one since they were established in 1950, getting almost 2 tons an acre in good years. His waterways are in excellent shape after 10 years. ''I have found that in addition to getting a hay crop, the annual cutting seems to thicken up the grass and actually makes the waterway better,'' Ray explains. ''Also, the removal of all that old growth leaves more space for the water to flow.''

Junior Snell, who bales the hay on his own waterways as well as for his neighbors with his pickup, self-tying baler, will tell you that ''Waterways are certainly not waste ground. In this country, where cattle feed is scarce, waterways can supply needed winter feed.''

Terraces are one practice in a complete conservation program, and they need help to do their job. The type of terraces used in this area do not greatly reduce runoff, but they concentrate it at the terrace outlets. Some way must be provided to carry this water to the large, stabilized drainageways. Otherwise, terraces may increase gully erosion.

Native pastures are the ideal terrace outlet, but on the majority of Kansas farms it is necessary to use some additional method of water disposal for at least some of the terrace systems or diversions. This means grassed waterways on many farms. Usually every quarter section to be terraced will need from one to five acres of waterways shaped and established to grass before all the terraces can be built.

The 11 counties in south central Kansas need many grassed waterways, because of the large percentage of land in cultivation. Since farmers in these counties began organizing their soil conservation districts in 1943, almost 19,000 acres have been put into grassed waterways on nearly 8,000 farms, with the help of Soil Conservation Service technicians. Completion of the conservation job will require 40,000 more acres of these waterways.

Newly baled native grass on Kent Newcom's waterway in Reno County.

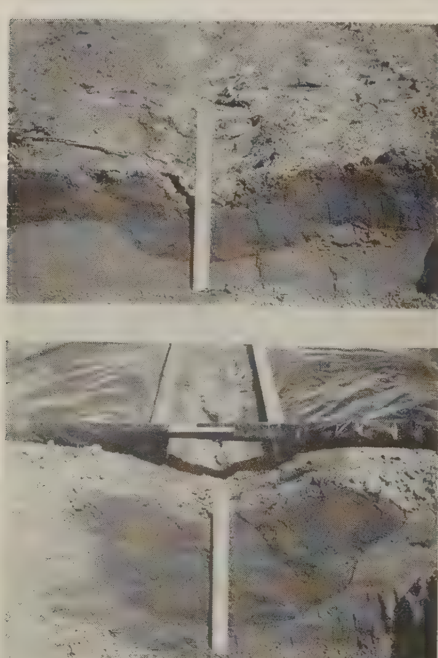
Soil Evaporation Is a Major Water Loss

By Omer J. Kelley

EVAPORATION of water from the soil surface is one of the main ways water is lost in any agricultural area.

It is estimated that of the amount of water that reaches the root zone under irrigated conditions, up to 50 percent is lost by evaporation from the soil surface. The problem is of equal or more importance on non-irrigated areas. For example, in the summer-fallow area of the Great Plains, it is estimated that at least two-thirds of the rainfall is lost by evaporation.

Studies have shown that if evaporation could be reduced by the equivalent of 3 inches of precipitation (15 percent in a 20-inch rainfall belt), the 10 Great Plains States alone would have an additional 300 million acre-feet of water—enough to fill Lake Mead. It has also been estimated that if evaporation from soil surfaces could be reduced by some 20 percent, it would practically eliminate the need for supplemental irrigation in much of the eastern part of the United States.



Soil moisture in normal field area (top) and (bottom) where ridges are covered with plastic.

Studies were made of the effects of varying amounts of plant water use on the yield of cotton at the Big Spring Field Station, Big Spring, Tex.; sorghum at the Central Great Plains Field Station, Akron, Colo.; and corn at the Northern Great Plains Field Station, Mandan, N. Dak.

The varying amounts of water available for plant use were obtained by the addition of irrigation water or the use of plastic materials to prevent evaporation of water from the soil surface. It should be pointed out that the research was conducted to study plant water use in relation to crop yield. While the increases in amounts of water indicated for plant use were not in all cases actually obtained by reducing evaporation from the soil surface, it is logical to assume that this could be brought about if ways could be found to reduce evaporation efficiently and economically.

The results for cotton in the southern Great Plains area showed that of 18 inches of water available, normal evaporation from the soil surface accounted for around 13 inches, and the plant used around 5 inches. Production of cotton was around 500 pounds of lint per acre. When 9 inches of water was available for plant use—and this could be obtained by a reduction of 4 inches in evaporation from the soil surface—then 900 pounds of lint was produced. When 13 inches of water was available for plant use, the yield was around 1,200 pounds of lint per acre.

In the central Great Plains area 18 inches of water was available for sorghum production. When the plant used 5 inches and 13 inches were lost by evaporation, some 15 bushels of sorghum was produced. When the plant used 8 inches, 75 bushels of sorghum per acre was produced. When the plant used 11 inches of water, 100 bushels of sorghum per acre was produced.

At the Northern Great Plains Field Station, where the normal evaporation of the soil amounted to about 12 inches and the plant used 6 inches, 25 bushels of corn was produced per acre. Where plant use was 9 inches, 75 bushels of corn was produced, and when plant use was 12 inches, 100 bushels of corn per acre was produced.

No. 64

This is the sixty-fourth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

These preliminary and as yet unpublished data show the tremendous potential that is available, in terms of (1) reducing the amount of irrigation required to produce crops, and (2) increasing crop yield, either without irrigation water or with a limited amount of irrigation water. Scientists today do not know of any practical means of reducing evaporation losses from

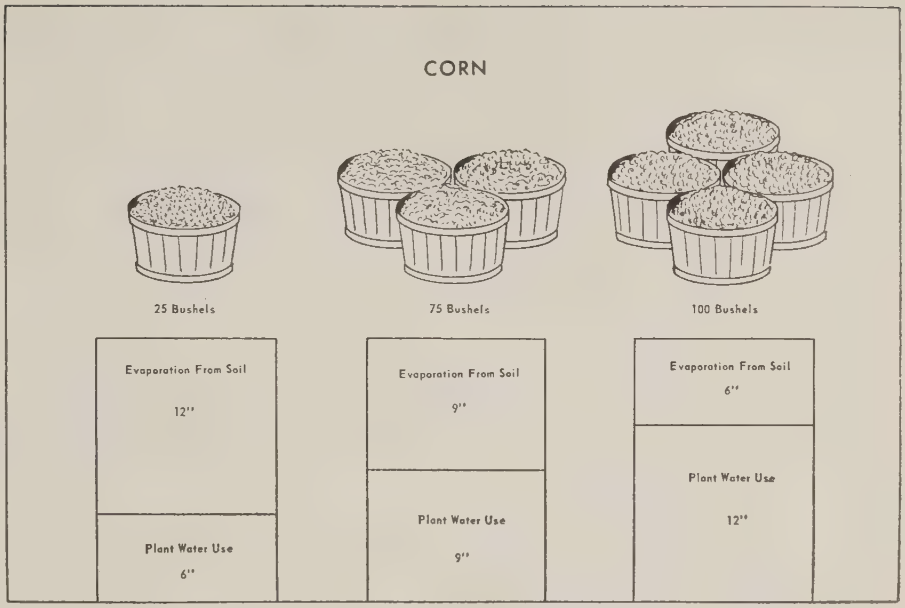
Note:—The author is Acting Chief, Northern Plains Branch, Soil and Water Conservation Research Branch, Agricultural Research Service, Ft. Collins, Colo.—From paper presented at National Water Research Symposium, Washington, D. C., March 28-30, 1961.

oil surfaces. There are, however, everal methods that show promise rom a research standpoint.

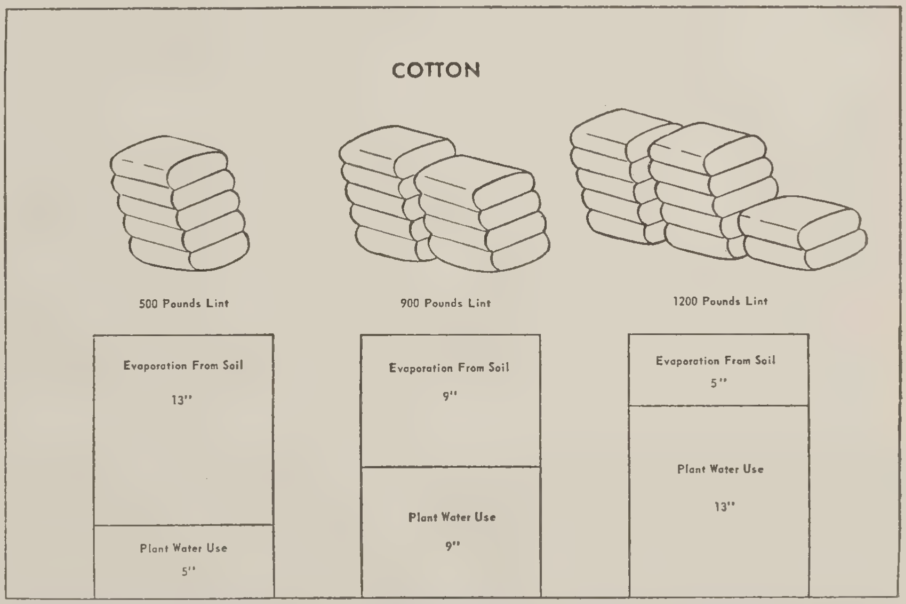
Various physical means show romise in reducing evaporation rom soil surfaces. It is known, for nstance, that the placing of gravel r coarse material over soil suraces greatly reduces loss of water y evaporation. It seems possible hrough proper treatment that mall clods could be stabilized and hese could be used as efficiently as ravel or other coarse materials. It s possible that the small clods ould be waterproofed so that water vould immediately move into the nderground portion of the soil eservoir. Then the clods would lso serve in reducing loss by evapration. Compaction of soil suraces frequently reduces both inake rate and evaporation losses. A thorough understanding of the hysical-chemical processes inolved in soil compaction is needed efore major breakthroughs will be nade in this area.

The use of chemicals to reduce or revent evaporation from soils also as great potential. We know, for xample, that plastic films will ractically eliminate evaporation osses.

In one field area, the ridges were overed with plastic to prevent vater intake and to prevent evapration losses, and another area did ot receive the treatment. Under ormal conditions, a ½-inch rain vas rather uniformly distributed in he upper layer of soil. Most, if ot all, of this water will be lost by vaporation from the soil surface. n the area where the ridges were overed, the moisture was concenrated in the furrow and reached a reater depth in the soil. Much of his water will remain in the soil nd become available to plants fter surface evaporation has been liminated. Intensive research is eeded to develop ways of obtaing deeper storage of soil moisture rom small showers, so that evaporation losses may be reduced and nore water made available to plants.



How corn yields increased as soil evaporation decreased at Northern Great Plains Field Station, Mandan, N. Dak.



Cotton yields went up as soil evaporation was lowered at Big Springs (Tex.) Field Station.

In irrigated areas, especially those producing vegetables and row crops, it is frequently necessary to apply several irrigations in order to get seeds germinated and a stand established. Much of the water is lost by evaporation. If some means could be developed whereby the seeded area could be covered to reduce evaporation and maintain a high moisture content, then irrigations normally used for seedling emergence and establishment could probably be eliminated. Excellent stands of grass seed, sugarbeets, and sweet corn have been obtained by using plastics over the planted area. This, of course, is not a practical method at the present time, but it does show the tremendous

potential for saving water if research can find practical and economical methods and materials.

What we need, perhaps most of all, is an understanding of the atmospheric environment and the soil environment as they affect the evaporation and use of water by plants. We don't know nearly enough about the single or interacting effects of wind movement, relative humidity, temperature, and light intensity on the evaporation processes and the use of water by plants. At the present time, to my knowledge, there are no facilities in the world that will allow for th study of these effects at variou levels and in combination with eac other. We are also still uninforme regarding many aspects of soi structure and dynamics of soi water as they affect evaporation o water from the soil surface.

Water Is Gold

To California Rancher

By Homer W. Marion

WHEN the John Hackamacks bought a 120-acre ranch in the Pajaro Valley in the Pajaro Soil Conservation District there was only enough water and feed for 12 head of cattle. Today, the Hackamacks, with the help of their sons, Paul and Karl, are irrigating 57 acres of pasture and raising registered shorthorn beef cattle which they sell to Fresno State College.

You can stand knee deep in grass on the Hackamack ranch and contrast it with the brown slopes nearby. John expects to carry about 75 head of breeding stock when the ranch is in full production, by impounding more than 30 million gallons of runoff water.

"That water is gold to me," says Hackamack. "Without it, the land wouldn't be worth anything."

With the help of Soil Conservation Service technicians working with the district, he started early on a long-range program of developing water, planting irrigated pasture, and saving his topsoil. In 1952, he dammed up a ravine and formed a reservoir that holds 44 acre-feet of water. He also received help through the Agricultural Conservation Program.

The job involved bulldozing out timber and willows and building a dam with carryalls. The reservoir captures and holds runoff water from the hills, which otherwise would flow out to sea and be wasted.

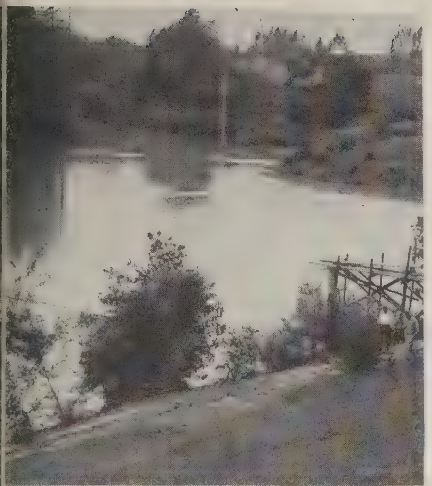
The dam is 18½ feet high and has nearly 6 surface acres. There is a concrete chute-type spillway on the west side of it to take care of excess water. After one heavy September downpour, the dam filled to near capacity from only 4 feet of water. There also are springs feeding this reservoir, and subirrigation in some of the pasture below it.

Three years later, Hackamack built a 10-acre-foot reservoir on top of a hill. When the reservoir behind the dam is filled, he pumps the excess water to this reservoir. The combination of the dam and the hilltop reservoir enables him to irrigate 35 acres of pasture.

A second dam, fed by two ravines coming out of the foothills,

Registered shorthorns on irrigated pasture near the John Hackamack home.

Note:—The author is work unit conservationist, Soil Conservation Service, Watsonville, Calif.



his 18½-foot-high dam built in 1952 ores 44 acre-feet of irrigation water.

as finished in the spring of 1957. is 23 feet high, also has a conrete spillway, holds 40 acre-feet f water, and irrigates 22 acres. portable pump is used to sprinkr-irrigate several pastures from oth dams.

Hackamack stocked the first dam ith large-mouth bass, bluegills, nd crappie. The second is stocked ith channel catfish. Fishing is xcellent, and he personally invites riends to come and enjoy the port. He also keeps a flock of geese n the reservoir to keep down the rowth of tules.

During the late fall, winter, and pring months, he runs his cattle n dryland pastures on the ranch. They are not allowed on irrigated astures during wet months, beause their hoofs would tear up the oil and trample grass into it, doing nore harm than good. Cattle likevise are not allowed to graze the rass too closely.

In 1955, Hackamack received a ertificate of merit for outstanding ccomplishments in soil conservai n, on the recommendation of the Pajaro SCD.

"Some of my land could be used or row crops," Hackamack said. 'However, most of it is rolling hill and, and I feel that from a conervation standpoint it is best uited to irrigated pasture."

Flood Problem Solved By Group Action

By D. C. Hadfield and Alvin Kranzler

HEAVY runoff from Houtz Canyon plagued the members of the West Ditch Irrigation Company in the Rockland Valley of Idaho for many years. The runoff meandered through dryland fields on the west side of the county road. A large amount of silt-laden water and debris bypassed the road culvert, sometimes washing out the road and the irrigation canal on the east side of the road, flooding ditches and fields and often causing severe damage to crops.

The West Ditch Irrigation Company of Rockland is a nonprofit organization owned and controlled by eight farmers. It provides water for approximately 450 acres of cropland. Disruption or interference in the flow of water had an adverse effect on the crops grown—and cost the farmers plenty.

In the spring of 1958, officers of the company recognized that help was needed to solve the problem and contacted Soil Conservation Service technicians assisting the Power Soil Conservation District. The SCS personnel made the necessary surveys, designs, and specifications for the project. They referred the officers of the ditch company to the Power County ASC office, where Agricultural Conservation Program payments were explained and applications were made prior to the start of construction.

The surveys and plans of action resolved by the West Ditch Company, County Commissioners, County Road Supervisor, the ASC, and SCS personnel, indicated that the following steps should be taken to solve the problem:

(1) Runoff from Houtz Canyon had to be properly channeled and

Note:—The authors are, respectively, work unit conservationist, Soil Conservation Service, and Power County ASC Office Manager, both of American Falls, Idaho.

A group inspects the grassed waterway that carries floodwater from Houtz Canyon to Rock Creek.

Group inspection of rock riprap where the grassed waterway from Houtz Canyon enters Rock Creek.

controlled on the west side of the county road. The roadbed had to be graded up and a bridge built to replace the culvert. The County Commissioners and Road Supervisor agreed to, and did, complete this project at their expense of approximately $1,260.

(2) The irrigation system had to be reconstructed by realigning the existing canal adjacent to the east side of the county road and installing a buried 96-foot-long, 24-inch concrete pipeline with proper end structure. In this way the irrigation water is carried under a grass waterway on the east side of the county road. This portion of the project involved considerable expense and engineering services. Officers of the irrigation association applied for ACP cost-sharing under a pooling agreement. The Federal cost-share approved was 50 percent of the cost of excavation, installation, and materials, which added up to $572.52.

(3) A waterway was established from the east side of the county road to Rock Creek to dispose of runoff passing under the bridge. This work was done, along with an ACP land-leveling practice, by an individual farmer.

The total cost of the entire project was more than $2,500; but the project and its obvious future benefits created so much community interest that donations by neighbors and local citizens reduced the actual cash outlay. For example, the grass seed and seeding of waterways was donated by individuals, as was the riprapping.

The multiple benefits from this project become more manifest each year. Officers of the irrigation district explain that the most obvious benefits are these: (1) The grass waterways convey the formerly damaging runoff into Rock Creek, where the water can be used beneficially downstream. (2) The county road, used by many people, remains in good condition at all times. (3) Crops in the valley no longer are destroyed or damaged by floods and silt deposits. (4) Farmers directly affected by the irrigation system indicate that efficiency has been increased immeasurably, and maintenance costs reduced by some 80 percent.

Melvin McLain (left) and Harold Permann watch irrigation water flow from the outlet of the 96-foot underpass of the grassed waterway that carries floodwater from Houtz Canyon.

Specialized Water Forecasts Promising

By Homer J. Stockwell

MORE specialized streamflow forecasts are being made by Soil Conservation Service snow surveyors in the West to give irrigators more precise information as to when they may expect peak and other predetermined flows during the cropping season.

Promising results have been obtained during the past few years in which this type of forecasting has been under development, as confirmed by the experiences of water users in the watersheds involved. They report having been better able to adjust their cropping systems to obtain maximum efficiency of water use.

The principal use of mountain snow measurements has been to forecast total streamflow during the irrigation season. This past season these forecasts were made at some 600 gaging stations in 11 States.

Forecasts of flow for the season have been adequate for water users' needs where enough reservoir storage is available to spread the peak flows of May and June over the peak demands for irrigation water of July, August, and September.

Note:—The author is soil conservationist, Soil Conservation Service, Portland, Oreg.

f the total streamflow is to be more r less than normal, the user knows e will have to adjust his crop acrege or demands accordingly.

Although more reservoirs are beng built every year, there still are any irrigated areas without storge. Crop production is limited by he flow of streams during July nd August where water is available only from direct diversions, nd to forecast the amount or timng of the low flow of a stream reuires considerably more detailed tudy of a watershed than to foreast the irrigation season's flow.

CS snow surveyors measuring snow depth and water content.

he basic information required inudes not only snowpack measureients and related hydrologic data, ut also information as to water ights, local irrigation practice, and etailed records of diversions and ater use.

In recent years, SCS technicians ssociated with snow surveys and ater-supply forecasting have coperated with irrigation district ianagement and water users assoiations to develop forecasting proedures for various aspects of the ow-flow hydrograph of streams.

At the April 1961 Western Snow onference at Spokane, Wash., iese problems were discussed by a panel of water managers and snow-survey supervisors. Representative of the problems and forecasting methods were those reported for the Sevier River Basin in Utah, the Carson Valley in Nevada, and the Grants Pass Irrigation District served by the Rogue River in Oregon.

President Leland C. Callister of the Sevier River Water Users Association, Delta, Utah, described the complex system of water rights in four or more irrigated sections of the Sevier River Basin. The most important forecast for the water users is one that enables them to know in advance the approximate dates during which their full primary water rights will be available, and then to know what percentage of their primary rights will be available for the remainder of the irrigation season. These primary rights total from 90 c.f.s. to 400 c.f.s. for the various irrigated sections of the basin. There is some storage on the river, used principally to capture winter flows and the top of peak flows during recently rare high-runoff years. Most years there is a deficiency of streamflow for demands.

Forecasting of the Sevier River requires a detailed study of snow accumulation and melt, groundwater carryover, return flow, low to intermediate elevation precipitation, soil moisture conditions, and a thorough knowledge of the sources of water for each irrigated section of the river. The upper sections of the river are most affected by the current year's snowmelt runoff, while the flows in the lower sections are more affected by groundwater carryover and return flows from upstream diversions. Forecast techniques make use of the above factors in several combinations, depending upon their relative importance for each irrigated section.

Because good records are available for most of the Sevier River Basin, it has been possible to develop at least seven special forecasts within a reasonable degree of accuracy. These include dates at which the streamflow will fall to a specified flow in c.f.s., the percentage of primary rights to be available, and the acre-feet of flow in excess of the normal diversion demands in c.f.s. that may be available for storage during the peak of

Mountain snowfall is the major source of irrigation water in the West.

snowmelt runoff.

William Johnson, Carson Valley Soil Conservation District rancher, reported that the critical low flow of the East Carson River near Gardnerville, Nev., was 200 second-feet. This amount of water will satisfy water rights of a priority before 1900. Water rights granted since that date are considered as flood rights and do not share in any flows below the 200-c.f.s. level. The forecast of the date of the decline of streamflow to this level is particularly important to "flood rights" users, because they will not have water available after that time.

The low-flow date of the East Carson River is forecast almost directly from measurements of mountain snowpack as of April 1 and May 1 each year. After the snowmelt peak has occurred, a forecast is prepared based on a multiple correlation of the amount of the peak flow and the number of days after April 1 that peak flow occurs, to that of the date of 200-c.f.s. flow. The peak flow usually occurs in mid-May, but may occur as early as mid-April and as late as mid-June.

Use of spring precipitation and temperature factors in the procedure is planned, and should increase the accuracy of the forecast. Forecast accuracy improves as more data become available. April 1 forecasts of the date of 200-c.f.s. flow made 6 to 12 years ago did not represent much improvement over simply forecasting the average date. Recent procedures have resulted in forecasts much closer, one-half of the error (in days), than if the average date for the flow of 200 c.f.s. had been selected. After the peak flow has occurred, the average error in the date of forecast is 4.7 days. The typical forecast is made 53 days before its occurrence.

Johnson said that during years of poor water-supply forecast, oats usually are seeded as a hay crop early in March, so it can mature before the streamflow drops off. Seeding of new alfalfa or pasture is avoided. The planting season plans thus are regulated by water supply predicted for the growing season.

Manager Neal F. Shaffer of the Grants Pass Irrigation District pointed out that flows of the Rogue River at Savage Rapids (Diversion) Dam under 900 second-feet are not adequate to meet all district demands. Minimum flows of 900 second-feet or less have occurred in only about 15 percent of the past 50 years, but it is important to know each year whether this will happen. When this low flow does occur, it is necessary to place canals in rotation.

Planning crop acreages in line with water-supply forecast helps farmers avoid crop failure like this.

The forecast of the minimum flow of the Rogue River is well related to April 1 snow measurements in the watershed. In 31 years available for comparison, the standard error of estimate is plus or minus 183 c.f.s., based on a mean of 1,077 c.f.s. A secondary effort to forecast the date of minimum flow shows that considerable improvement can be made over simply using the "average date" in low-flow years after the 200-c.f.s. date on a receding hydrograph is known. There is an average of 58 days between the 2,000- and 900-c.f.s. levels.

The low flow of a snowmel stream in any year is determine largely by the amount of the sea sonal snowpack and the related vol ume of seasonal runoff; the temper ature sequence, related to th amount and timing of peak flow and precipitation during the runof season immediately preceding an during the period of low flow.

The amount of the seasonal snow pack is the major determining fac tor that is known well in advance Because the temperature and pre cipitation factors occur within th runoff season, their value is limite to refining forecasts as late as Jun 1 or possibly July 1. Even this late farmers can withhold water from such crops as alfalfa and pastur and concentrate on field crop which would be a complete loss, i late-season water supply appears t be somewhat less than anticipate earlier.

◆

Water quality determines th worth of water for a particular use Some water is suitable only fo fighting fires or washing streets Other water is of excellent qualit and in great demand.

◆

For a 30-year period the Mis souri River at Bismarck has had a average flow of 21,240 cubic fee per second, or 15,380,000 acre-fee a year. The flow has ranged from an extreme of 1,800 cubic feet second to 500,000 cubic feet second.

◆

We can live longer without foo than we can without water.

◆

"As the total demand for wate increases and as the competitio among uses becomes more intense it seems certain that society wil not tolerate inefficiency in use."

—Dr. Roy Huffma
Montana State Universit

Water Management Remakes Muck Pasture

By C. F. Lind

AN effective conservation water management system has enabled L. Neal Smith of Montverde, Fla., to double the number of cattle on his muck-land pasture. Smith also is a citrus grower and is a cooperator with the Lake Soil Conservation District. He has been fighting the natural elements for years, particularly in developing and using his muck pasture.

"I'm never completely happy," is the way he puts it. "When we don't get any rain my groves suffer, and when we get too much rain, my muck farmland and pastures are too wet and I can't get on them."

His approximately 400 acres of old muck pasture is surrounded by higher, sloping sandy soils. Highland citrus groves virtually surround the muck area, with Lake Apopka on the east. The lake level is 2 to 3 feet higher than the average muck elevation. Consequently, there were two main problems to be solved. The first one was to keep Lake Apopka water out; the second, to divert and get rid of seepage water from the surrounding higher land.

When Smith came to the SCD office for help, he already had a dike constructed to hold back Lake Apopka; and a main canal through the middle of the muck area, plus a number of lateral ditches, had been dug. A pumping station with one 30,000-g.p.m. low-lift pump and two smaller automatic electric pumps were installed. The pumps are more than adequate to control the seepage water, but water was not draining out of the muck fast enough during and after rains, leaving large areas impossible to work for long periods.

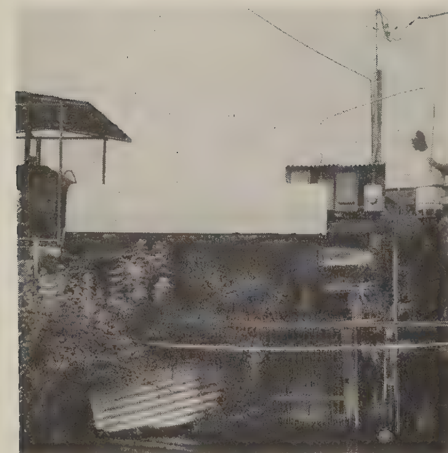
"I've already spent thousands of dollars, but so far it's been almost a losing battle to control the water," Smith said. "I want your help—whatever you say will be done."

Soil Conservation Service technicians assisting the Lake SCD made a preliminary check of the entire area, making borings to check soils and water levels to establish the feasibility of a more complete water-control plan. Next, a complete topographic survey map was made.

Muck areas usually are level, but Smith's muck land varied in elevation as much as 5 feet. The proj-

Owner Neal Smith (left) and C. F. Lind of the SCS look over cattle on improved muck pasture.

Note:—The author is conservation aid, Soil Conservation Service, Tavares, Fla.



Automatic pump station with 42,000-g.p.m. capacity removes seepage and floodwaters.

ect accordingly had to be divided into separate water-control areas, with all outlets leading to the main discharge canal and drainage pumping station. A complete water-control system for drainage and irrigation was designed and laid out.

A few lateral ditches were relocated, others had to be extended, and 12 more laterals were constructed. Grade- and water-control structures were installed in laterals for water control and irrigation purposes. These structures also are used as bridges in the farm road layout.

Irrigation water is supplied by wells at various points of higher elevation throughout the area. Nine hundred feet of 6-inch tile was installed in one area, to intercept seepage from higher ground and thereby remedy the wet condition of one particularly troublesome area.

Benefits from the new-water disposal and irrigation system are threefold. Excess water is now removed and all the muck areas made accessible in a few days. Smith's

Lateral ditch in Neal pasture with citrus orchard beyond.

300 head of cattle now find good grazing in the pasture-rotation system. He harvests silage twice a year from such crops as oats, millet, and fescue, with yields of up to 7 tons an acre from each cutting.

Those are reasons why Smith says he is pleased with his water-control system and that the money spent was a good investment.

WATERSPREADING

Puts More Raindrops to Work

By Herbert I. Jones

LAST summer when things were dry in western North Dakota Kermit Perhus was getting a second cutting of hay where once only sparse grass grew.

Key to Perhus' success is a spreader dike system he built to guide hill runoff onto lowland grass. The result has been early spring grazing and hay when other ranchers in the neighborhood have reported dwindling feed.

The Perhus ranch near Marshall is small as ranches go in that area, and a grass failure on a small ranch can spell disaster with a big "D." Perhus cut the chance of failure by, as he puts it, "making every drop of water count." At the same time, Perhus' upland range is in better shape than ever—cushioned by the abundant hay.

The change that made all this possible began about 10 years ago when Perhus tired of watching runoff sweep by grass thirsting for a drink. He had read about water-spreading work in other areas.

Soon, with the help of a neighboring soil conservationist, Perhus worked out the system of ditches and dikes to divert channeled water back onto the flats. As a result, he was able to grow 100 acres of native hay—no small item on a 2,500-acre ranch. Since then, by planting tame grasses in disturbed areas, Perhus has increased the hay land to 200 acres and also increased the tonnage.

Perhus learned in the first few years that mother cows could be kept on the meadows until late June without reducing hay yields. Summer feed thus saved has meant better management of the native range as a bonus.

By 1952 Perhus was, as he says, "at it again—putting more raindrops to work." That year he built dikes with the Dunn County Soil Conservation District's terrac-

Note:—The author is information specialist, Soil Conservation Service, Denver, Colo.

ıg equipment. It was the first time ıe cropland equipment had ever een used on range work. Later on e used motor-patrol graders.

Almost every year since then, erhus had added to the system of ikes crossing his lowland range. nd-to-end, the segments would otal around 8 miles—and there is ore dike work slated on the Perus calendar.

He likes to build his spreader ikes so they settle solidly to 2-foot height. If dikes are wide nough, he points out, you can mow ght over the top when you decide cut hay. He suggests from 30 to) feet for the bottom width.

Perhus plows and seeds oats, allfa, and bromegrass in the spring fter a new set of dikes is estabshed. Before long the grass catches." Yields of up to 2 tons f hay to the acre are common after ıat. Counting the grass harvested early spring grazing, Perhus figres he is getting up to 4 tons of ed to the acre off of the watered art of his place. Yields have been ood enough, he reports, to pay for ıch set of spreaders within a ouple of years.

Perhus' better water utilization nd hayland improvement have pelled a big difference on the family ranch. His breeding herd has been brought up to 125 Hereford cows, and his range is in better shape than ever. A wildlife crop—deer, pheasants, grouse, and partridge—lives off the bounty. Local friends know the Perhus ranch as a hunter's paradise.

Jeanette Perhus likes to ride her quarter horse and help her father check his Circle Cross herd on his 3,000-acre range of good to excellent native grass.

Perhus was recognized for his ranching success a year or so ago when he was named winner of the Liberty Bank trophy for the year's best pen of yearlings. Enabling him to win were good breeding matched with range management, plenty of hay from the waterspreading area, and some silage and grain from his 120-acre corn field.

Along with Perhus' livestock and feed production interest has been his concern for soil and water development and conservation. He has a complete conservation ranch plan worked out with the help of Soil Conservation Service technicians assisting the Dunn County district. The waterspreading work is only a part of his soil and water conservation system. He now has adapted his plan to the Great Plains Conservation Program.

ourishing mixtures of tame grasses and legumes along Perhus' new spreader dikes eventually will be taken over by spreading native grasses.

◆

Tests conducted by two Nebraska scientists show that it is practical and feasible to utilize grass waterways for the disposal of irrigation waste water as well as high-velocity rainfall runoff.

◆

The Great Lakes contain the world's largest supply of fresh water—6,700,000,000,000,000 gallons.

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DISTRICT PROFILE

Teacher and Conservationist

"A PROPHET is not without honor save in his own country" does not apply to F. E. DuBose of Gable, S. C.

Reared in the East Clarendon School District No. 3 of which he is superintendent, he holds or has held numerous other positions of leadership and responsibility, including being a supervisor of the Clarendon Soil Conservation District for all but about two years since its organization. He has served as teacher, coach, principal, and superintendent for a total of 32 years.

The district supervisor job is non-salaried, as are most of the positions he has held. DuBose figures that his pay is service to his fellow man. This is how he describes it:

"You can ride along the road and see that the panorama has been changed by efforts of the Clarendon Soil Conservation District. It has improved the economy of the county by improving production on land once low in production. The Long Branch ditch revolutionized farming in the community. A preacher remarked to me recently, 'I have never seen a community develop like Barrineau Crossroads Community.' Soil and water conservation and proper land use are a big factor in the improvement of economic conditions in this community and throughout our soil conservation district."

Supt. F. E. DuBose (left) and John M. Dukes of the SCS discuss teaching of soil and water conservation.

DuBose is president of the South Carolina High School Athletic League, a member of the South Carolina Advisory Council on Conservation Education, and past president of the Clarendon County Educational Association and of the South Carolina Elementary Principals Association. Getting conservation taught in schools holds his special interest.

"My observation is that teachers have a desire to teach conservation by relating it to subjects taught," he says. "But, they don't have the know-how in all cases. They need more material and training related to teaching conservation of soil, water, woodlands, and wildlife."

DuBose is president of the Clarendon County Chamber of Commerce, county Farm Bureau director, president of Ruritan, vice president of the Pee Dee Area Council of Boy Scouts, elder in the Sardinia Presbyterian Church, first vice president of the Clarendon Tuberculosis Association, and chairman of the Camp Harmony Committee, and is on the board of trustees of Clarendon Memorial Hospital.

Positions he formerly held included those as: President of the Clarendon County Farm Bureau and State Farm Bureau director, chairman of the South Carolina Agricultural Committee, president of Men of the Church for Harmony Presbytery, and National Democratic Convention delegate.

DuBose's philosophy: "I like to see a man proud of the place where he lives, and to see a man so live that his place is proud of him.

—J. B. EARL

SEPTEMBER 1961

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

"Whatever pains we take, whatever expenses we incur, in collecting instruments of husbandry, in accumulating and applying manures, and in tilling the earth; all is to little purpose, unless to these we superadd a succession of crops, adapted to the nature of the soil."
—Solomon Drown

COVER PICTURE.—These farms in the Monroe Co., Wis., Soil Conservation District illustrate good conservation cropping systems combining contour stripcropping and grassed waterways with crop rotations.

VOL. XXVII, No. 2 SEPTEMBER 196

CONTENTS

Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAM
Administrator, Soil Conservation Serv

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FRANK B. HARPER, Editor

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Cropland Conservation

By Donald A. Williams

"SOIL management" are two key words in soil and water servation on croplands.

We make soil surveys to learn nature of the soil and of land pe, erosion, and other factors cting its producing abilities. l surveys and water relationps are the basic starting points conservation. We manage and re our agricultural water, by use irrigation, drainage, ponds and ervoirs, terraces, and other uctures, and especially in the l itself. This water is the life the soil. And we develop crop ieties, grass, and trees that will w best on different soils. Such nt development and adaptation essential to best use of the land production of food and fiber, l for erosion control and convation land use.

Soil management is the means which we bring soil, water, and nts together in a natural and rmonious partnership that best ves cropland needs. It is not t some new agricultural techogy. It is as old as the days en American Indians buried fish ngside their planted corn kers to assure their germination d growth. It is as old as the time George Washington and Thomas fferson, who grew "lucerne" and as to improve the soil on their rginia plantations. It is as old the generations of later-day toco growers who burned brush their seedbeds to kill weed seed.

Soil management is the same in inciple as it always has been; t it is vastly different in modern ricultural practice, with the benefit of soil, water, and plant conservation and other refinements of scientific agricultural technologies.

We still plant fish with our corn, but as a scientifically processed ingredient of some of the numerous commercial fertilizers used, in addition to barnyard and green manures, to improve crop production. We still grow alfalfa and peas, but they are only two among an almost endless variety of improved legumes and grasses, adapted to specific soil conditions, that today's farmers grow for soil improvement, conservation land cover, and forage. And we still eradicate weeds in our tobacco beds, and everywhere else they interfere with cropping; but we do so by using chemical weedkillers, weed-free seed, and special tillage and cropping methods.

The ability of any soil to respond to conservation management is determined by its inherent characteristics; so we must fit management to the soil and water situations. Thus we can apply organic matter and fertilizers to increase available plant nutrients for our crops; but it is not easy to change the depth of the topsoil layer which crop roots must have above hardpan or bedrock. We cannot change the steepness of slope; but we can, in effect, shorten its length, by using such conservation measures as terracing, contour stripcropping, cover cropping, and residue management.

The effectiveness of conservation soil management rests upon a combination of improvement and protection measures. Each must support the others. A system of crop strips, for example, is no better than the crop rotation that it comprises. Planning a conservation cropping system to fit the soil's and the farmer's needs is just as important as designing an engineering structure. Specifications for conservation treatment of cropland accordingly are based on soil conditions, moisture relationships, climatic influences, and the landowner's economic and other needs.

How the farmers and ranchers of the United States have been turning the principles of conservation to their own and the land's advantage is reflected in such measures as those now being applied on croplands in soil conservation districts: Approximately 100 million acres of conservation cropping systems, 40 million acres of contour farming, 22 million acres of cover cropping, 75 million acres of crop-residue use, 17 million acres of stripcropping systems, and 18 million acres of stubble mulching.

A high percentage of farmers obtain most of their income from cropland, either in cash crops or in feed for livestock. Others obtain their income from orchards, vineyards, and small fruits. What the future holds for them as producers and for all of us as consumers will depend to a large extent on their conservation use and management of all of these lands. For all of us, too, the degree to which water infiltrates into the soil and is detained on the surface greatly influences the rate of siltation of our streams and reservoirs and the damages from uncontrolled waters.

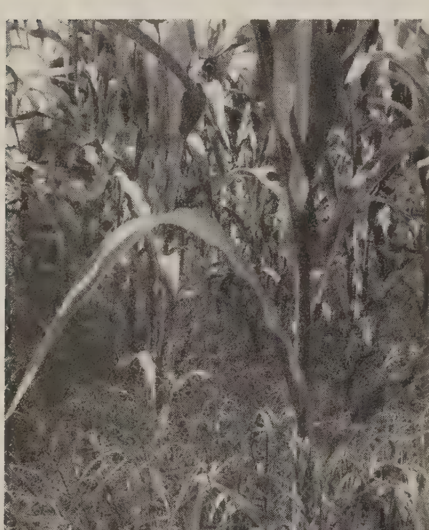
Georgia Farmers Like Grass-Based Rotations

By L. R. Payne

OLD prejudices against grass on cropland are fast disappearing in the South as farmers with modern equipment have learned how to use grass in their crop rotations and experienced its many benefits.

In Georgia, for example, the greater part of the row-crop land is in the Coastal Plain. Farmers in this area are growing tobacco, corn, and other crops successfully in coastal bermuda and bahia grass sods. The grass reestablishes itself following the row crops.

C. F. Morris, who operates a large tobacco and dairy farm in Appling County, was one of the first Altamaha Soil Conservation District cooperators to take a chance on such a "radical" practice as growing tobacco and cotton in coastal and bahia sods. He found that anticipated difficulties in cultivating did not materialize.



Bermudagrass recovery in corn where row crops and grass have alternated 6 years.

"Our crops were grown under drought conditions from 1953 through 1956, and the crops in grass held up better than the crops not in grass," Morris said. "Then we had wet seasons from 1957 through 1960. We found that the crops also held up better in grass during the wet seasons. We have learned a lot about land preparation for sod planting. This year we cross-harrowed three times to cut up the sod, subsoiled, and made a furrow with an opening plow and planted. This let the grass come back without losing the stand. Once or twice before, we had killed the stand by overdoing the land-preparation job."

Morris reported that his 5 acres of tobacco grown in coastal bermuda sod in 1960 averaged 2,442 pounds an acre and brought an average return of $1,511 an acre.

The system generally followed is to grow one crop of tobacco, corn, or other row crop in a 3- or 4-year sod. The grass is allowed to become reestablished after the last cultivation. Thereafter, a row crop is grown every second, third or fourth year. Various methods of land preparation are used. Most farmers do some harrowing to cut up the sod, turn the land with a moldboard plow or tiller, and harrow again to give a smooth seedbed.

Soil Conservation Service technicians have found the best way to plant in coastal or bahia sod is to put the corn right in the sod with a mulch planter. It mixes grass stubble and soil in the middles and forms a water-holding mulch that helps keep down weeds and grass until the corn is well along. This method also eliminates land break-

District Cooperator C. F. Morr (right) and SCS Soil Scientist Erw Iseley examine bahiagrass sod bein turned for planting field to tobacc

ing and harrowing and saves $ or $9 an acre in land-preparatic costs.

In a study of the organic-matt content of soils on the Morris far in 1953, they found that soil wi a 4-year sod of bahiagrass co tained 15,000 pounds of dry o ganic matter to the acre. After o crop in this sod, the soil contain 10,000 pounds of organic materi After a second crop, when the gra had been completely killed out, t soil still contained 7,500 pounds organic material an acre. The high organic-matter volumes co pared to only 3,000 pounds acre on similar soils in continuo cultivation without sod.

One of the principal crops in t Georgia Coastal Plain is cigarett type tobacco. It had become dif cult and expensive to produce good tobacco, because of root-kn nematodes and diseases prevale in the tobacco belt. Growers n grass is virtually disease free a are finding that tobacco grown

Note:—The author is area conservationist, S Conservation Service, Soperton, Ga.

oes not require fumigation as ommonly practiced. Grass-rotaion tobacco also brings top prices. 'hese benefits are most important › growers of a crop that grosses 800 to $1,500 an acre on acreage mited by allotments. Morris figres that growing tobacco in grass aves him $20 an acre in his fumiation bill alone, and cuts his hoeng costs in half.

James Graham, cooperator with ne Altamaha district, has been rowing crops in grass for 5 years. n 1960 he used a lister planter for lanting 45 acres of corn directly nto coastal bermuda sod without nd preparation. A severe drought amaged crops in Graham's comiunity, but his corn suffered little pparent damage.

"I never expect to grow corn ny other way," he commented.

W. V. Head in the same district as found that dairying and grassased rotations just naturally go ogether. He uses his grass for razing and hay production when is not in row crops. His land is ut of forage production only about months every second year when

Coastal bermudagrass (foreground) coming back in tobacco rows.

row crops are growing on it.

"The grass coming out under the tobacco holds the lugs or bottom leaves off the ground and keeps them from sanding or burning," Head pointed out. "We get a couple more lugs to the stalk, and that means money in the pocket. In addition to good yields of disease-free tobacco, we save a $10-an-acre hoe bill, and get 2 or 3 months' grazing after the tobacco is harvested."

H. G. Miles, another Altamaha district cooperator, kept detailed records in 1956 showing that tobacco planted in grass produced 2,345 pounds of tobacco an acre and gave him an average return of $1,248.62. Where the tobacco was not grown in rotation with grass, the yield was 1,647 pounds, with a return of only $887.57 an acre.

Chairman K. C. Mayers of the Altamaha district board of supervisors, who grew his second crop of tobacco in bahiagrass in 1960, commented that it was "the easiest crop to make I have ever grown." His brother, Ed, reported he averaged 2,640 pounds of tobacco an acre on 8½ acres planted in grass, which brought him an average return of $1,545 an acre.

Along with their sod-based rotations and mulch tillage, farmers in the area are building parallel terraces and sod waterways, and are using other soil and water conservation measures that are bringing them more profits and a better way of life.

Green Thumb Works

In "Thumb of Michigan"

By L. W. Kellogg

COOPERATORS of the Tuscola Soil Conservation District in the heart of the "Thumb of Michigan" are proving what proper soil management can do to improve mediocre yields on many of its thousands of acres of soil with a high yield potential.

Ralph Ackerman is one. Seven years ago, he added 160 acres of mostly loam and silt loam land to the 250 acres he already owned. It is all in Capability Class I, but it was in poor condition when he bought it, because it had not been managed properly.

For many years, it had raised virtually nothing but cash crops, with little residue returned to the soil, and no hay, green manure, or cover crops grown. The few lines of tile that had been installed by hand were not working. As a result of this system of management, the land had been worked wet in the spring and again in the fall when the crops were harvested. These factors combined to destroy the structure of the soil and pack it so hard that water stood in some spots nearly the year around.

"I tried to work up some of the land with a field cultivator to prepare a seedbed for wheat," Ackerman remembers. "But the ground was so hard that the cultivator would hardly make a scratch."

He borrowed a field cultivator that would go into the ground, but

Note:—The author is work unit conservationist, Soil Conservation Service, Caro, Mich.

the tractor couldn't pull it because the ground was so hard. He finally hooked two tractors together and, after working the field twice. got a fair seedbed that enabled him to put in wheat. In the spring the wheat was seeded to a mixture of sweet and mammoth clover. After wheat harvest, the entire field was tiled, using 4-rod spacing. The next spring he plowed the clover down and put in navy beans. The clover stand was not too good that first year, but it provided the most organic material that had been added to the soil in many years.

By April 1961, the soil structure was excellent. This improvement had been brought about in 6 crop years by following good soil and water management practices as outlined by technicians of the Soil Conservation Service assisting the Tuscola district.

Ackerman's rotation includes cover crops after his row crops, and a green manure crop of mammoth clover in oats and an equal mixture of sweet and mammoth clover in wheat. He returns all crop residues to the soil, and fertilizes heavily. Minimum tillage also is playing its part in improvement of the soil structure, by reducing soil packing by heavy equipment.

A sample of Frank Nagy's 90-bushel oats held proudly by daughter Julia.

In 1959, Ackerman's 48 acres of sugar beets averaged 22.5 tons an acre; his corn yields are well over 100 bushels of shelled corn an acre; his oats yield from 125 to 150 bushels, and beans more than 30 bushels an acre. His wheat yields run from 50 to 60 bushels. This increased efficiency in production has been made possible because excess water now moves readily out of the soil, and farming operations can be carried out on time.

''Without a good soil and water management program I couldn't afford to own and farm this land today,'' Ackerman said.

When Frank Nagy, a Tuscola district cooperator since 1952, bought his 120-acre farm, on which the cropland is mainly Classes II and III, the soil was in such poor condition it produced principally mullein and milkweed. The first year, he put in 4 acres of corn and harvested a total of 50 bushels, mostly nubbins. Seventeen acres of oats produced about 25 bushels. Even the hay crop was so poor that he raked as many as four 7-foot swaths into one windrow for baling.

''I knew we had to do something if we were going to make a living on this land,'' Nagy said. ''We could raise practically nothing at first. In fact, I worked in town to help make ends meet.''

After following out his soil and water conservation plan for several years, Nagy is obtaining oat yields averaging 90 bushels an acre with a test weight of 38 pounds, 60 bushels of shelled corn to the acre, and a hay crop so heavy that last year the baler would handle only one 7-foot swath.

Soil tests on his crop fields showed they all needed lime and were low in phosphorus and potash. He limed fields as rapidly as he could, and started using high amounts of complete fertilizers. He plowed down all the clover and other organic materials that he could work into his cropping system.

Ackerman now follows a 4-year rotation of corn, oats, and 2 years

Ralph Ackerman and son, Lyle, study excellent soil structure resulting from conservation management.

of alfalfa-bromegrass meadow. His 33 dairy cattle produce a lot of manure, which he spreads on meadowland that is to go into corn the following year. He applies 450 pounds of 12-12-12 fertilizer on the oats, which are seeded to alfalfa-brome. Then he topdresses the second-year meadow with 600 pounds of 0-20-30.

◆

Cover crops are especially good insurance against soil blowing. A Grafton, N. Dak., farmer uses a cover crop on summer-fallow ground on which he plants beets in the spring. Between September 1 and 5, he seeds oats, or treated wheat and barley left over from spring seeding, at the rate of ½ bushel an acre. The next spring he plants beets into the cover crop with assurance the young beet plants will not be blown out and will get off to a good start.

◆

Growing 2 rows of corn at 75- to 150-foot intervals on loam or sandy soil on a 70-acre fallow field helped to control wind erosion and catch snow at the North-Central Branch Experiment Station near Minot, N. Dak. The 75-foot spacing was more than adequate for holding snow for storing soil moisture; but the 150-foot spacing while appearing to control wind erosion, allowed the snow to drift and exposed bare strips of fallow

Cutting Down on Cropland Soil Compaction

By A. W. Cooper

FARMERS and farm machinery manufacturers as well as soil cientists and agricultural engieers have given serious attention the problem of soil compaction hat has been increasing in recent ears because of the use of heavier achinery and more traffic over e fields.

Not all compact soil results from affic forces, however; some dense ils were formed by nature. Much mpaction also has been caused y a decrease in organic matter relting from continuous intensive ropping to row crops, without rerning the residues.

In order to decrease soil comaction, we need to understand the rces that cause it, and to combine roper design and use of farm mahinery with good soil-management ractices.

Compaction, or the increasing of the soil bulk density by the reduction of pore space between the soil particles, affects all life within the soil. It reduces the space available for air diffusion to the roots. It decreases the intake rate and transmission rate of water.

The relationship of the soil's physical properties to plant growth is complex, and it is difficult to determine the extent of crop-yield reduction caused by soil compaction. It is relatively easy, however, to examine the soil to see if a very dense layer has formed just below the normal plowing depth. This layer usually can be located with a shovel. The water-infiltration rate of the layer can be checked by using a cylinder made from a tin can. Water is poured into the can to a depth of 1 inch, and the time taken for the water to enter the soil is noted. The same test can be performed in subsoil simultaneously. If the subsoil takes in the water much quicker than the layer above it, the chances are that there is a compacted layer that should be removed by tillage.

otton root on right grown on sandy loam soil with a compacted layer. Root on left grown in same field where compacted layer had been broken up.

No. 65

This is the sixty-fifth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

The most common tillage practice today is to plow with a moldboard or disk plow 3 to 8 inches deep, and then to harrow lightly with a disk harrow to break up the clods. Admittedly, much food and fiber has been produced using this method of tillage, and it will continue to be used. However, we should take a look at our soil condition and plan our tillage practices based on the soil's needs. Under many conditions, we are compacting soils beyond the condition for optimum plant growth. In other cases the soil is naturally dense below the normal depth of plowing.

The compaction resulting from a given load applied to the soil depends upon the mineralogical, organic, and mechanical composition, the moisture content, and the initial consolidation of the soil. In general, a cohesive soil with a high percentage of clay or silt will not

The author is director, National Tillage Machinery Laboratory, Agricultural Engineering Research Division, Agricultural Research Service, Auburn, Ala.

compact as much as a sandy loam soil at the same moisture tension and subjected to the same load. Also, some clays are less susceptible to compaction by mechanical loads than are other clays. The moisture content greatly affects the soil's susceptibility to compaction. At low and very high moisture contents the soil does not compact as much as at intermediate moisture contents. But, when the moisture content is high and water is squeezed out, compaction results from smearing, or puddling.

Along with the decreasing pore space, compaction causes an increase in soil strength, which must be overcome by tillage or by the growing roots. A number of studies have shown that a compact soil reduces crop yields. In Louisiana, cotton yields were increased from 1.5 to 2.5 bales an acre by loosening a compacted layer. In California, the yields were increased from 0.5 to 2 bales an acre by loosening a compacted layer in a sandy loam soil.

In some cases, equipment needs to be redesigned to minimize soil compaction; in others, compaction can be minimized through proper use of present equipment. For example, in the case of the tire running in the furrow, if it were to ride on the unplowed surface along the edge of the furrow, the load would be applied to drier soil less

Compacted layer (light area) between strips subsoiled before 1-inch rain showed few roots, because water did not penetrate it.

susceptible to damage. Also, the greatest part of the soil compacted by wheels would be broken up by the tillage. Here the design of the equipment in most cases must be changed to allow operation of the wheel out of the furrow. The disk harrow is useful for reducing clod sizes, but it has been found to do damage, especially to sandy loam soils, if the soil is harrowed several times before planting.

Careful driving between rows during cultivation and other tillage operations can reduce the compacted area. Driving in the same tracks minimizes the compaction, because most of the compaction is done by the first trip over the soil.

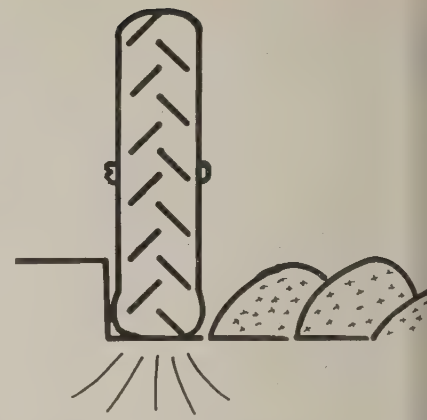
Chisels may be used to break up soil compacted by wheels. Subsoiling and other deep-tillage practices are beneficial, when they sufficiently pulverize a soil that needs loosening. It is important to make careful examinations before subsoiling to determine if the soil needs loosening and, if so, to what depth.

Tillage remains more of an art than an exact science. The use of a shovel is helpful in determining the location of compact layers, and in determining the degree of breakup accomplished by a tillage operation. Where good pulverization is desired to a considerable depth, it has been obtained by taking small cuts at 2-inch increments of depth rather than by subsoiling the full depth desired.

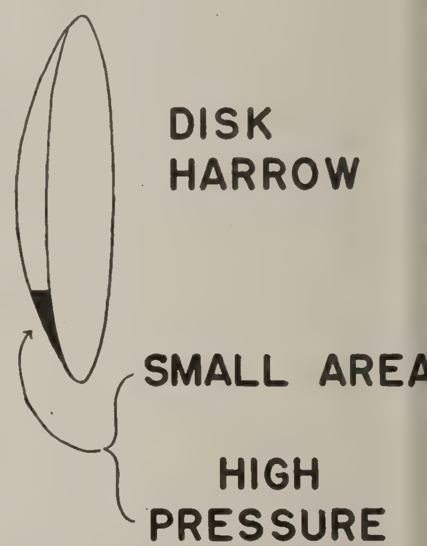
Deep tillage, combined with growing deep-rooted crops like alfalfa, helps improve soil structure. Incorporation of plant material improves soil structure and makes it more resistant to compaction.

We also need a method of tillage in which we do not recompact the soil we have just loosened, and in which the soil is loosened to the depth needed, with the soil under the crop row not compacted.

A deep-tillage study has been initiated by the National Tillage Machinery Laboratory on Lloyd clay loam soil, which is naturally dense from the surface down. The soil is pulverized in strips approxi-



Tractor tire running in furrow compacts soil below tillage depth.



Mismanaged disk harrow also can cause a compacted layer below cutting depth.

mately 18 inches wide and 1[illegible] inches deep, on 40-inch centers. The tractor tires operated on firm soil and therefore did not recompact any loosened soil. The soil was prepared in the fall and planted in the spring. A much better stand was obtained on these plots than on the conventionally tilled plots which were plowed in the spring, causing the soil to dry more before planting. Although we are not ready to recommend trench tillage, work is in progress at several locations on various methods of strip preparation of soil; and it has good possibilities as a method of decreasing soil compaction in row cropland.

Now Can Sleep Nights—

Gets High Wheat Yields

By Walter N. Parmeter

COOPERATOR Ralph Letellier in Sully County Soil Conser-ation District, S. Dak., credits s consistently high winter wheat elds and being able to sleep ghts both to wind-erosion control ith stubble-mulch tillage and ripcropping.

"When my summer-fallow fields ew, I couldn't sleep," Letellier id in reporting that during the ast 7 years he has had an average eld of 27 bushels an acre on his 00-acre wheat base. "My wheat-eld success has been due to pro-cting the soil from wind erosion nd keeping the residue on the il."

With the help of the Sully ounty SCD, Letellier laid out his heatland in 20-rod diagonal strips a right angle to the prevailing inds. These strips are rotated, heat on fallow, each year.

In the fall, soon after the strips e harvested, they are worked ith either a chisel or a one-way isk, depending on the amount of

A full 640-acre section of wind stripcropping on Ralph Letellier farm, including two grassed landing strips for this flying farmer.

fall moisture in the soil and amount of residue and weed infestation, to kill weeds and loosen the soil for rapid moisture penetration. Ralph likes to adjust his one-way to a small angle, cutting just deep enough to kill the weeds, and operates at a speed which will leave the residue partly standing to catch more snow for additional moisture. During the next summer-fallow season, the strips receive two to four additional fallow operations, depending on the amount of rainfall, before planting to 30 pounds of Nebred winter wheat to the acre early in September.

Letellier also rebuilt his grain drills with large shovels and 20-inch row spacings between shovels, rather than the conventional 14-inch spacing. These drills not only plant the wheat down where there is moisture; they also make a large ridge between wheat rows, that helps prevent wind erosion as well as protecting the wheat plants from winterkilling.

The next spring, when the weeds start growing and the grain usually is 4 to 5 inches high, he uses a rotary hoe to kill the weeds and to break the soil crust. If the weeds continue to be a problem because of frequent rainfall, he sprays the wheat with 2, 4-D.

Growing wheat in 20-inch rows does not produce as high yields in years of ample rainfall as those of the 14-inch rows; but in 1959, a drought year when neighbors were lucky to get their seed back, Leteillier harvested 20-bushel wheat. He consistently has one of the highest wheat yields in Sully County, including in dry 1961.

He believes that the wheat stubble and straw are too valuable to feed to livestock. He says there is

ind erosion has been eliminated on etellier farm with crop residue, ough tillage, and diagonal wind strip-cropping.

Note:—The author is agronomist, Soil Conservation Service, Huron, S. Dak.

no other material that contributes as much to soil productivity on his wheat farm as the residue he maintains on his land, because it improves the tilth, helps prevent soil erosion, and increases the soil's water- and nutrient-holding capacity.

Letellier is convinced that successful winter-wheat farming in the Great Plains is dependent upon protecting soils from wind and water erosion, and that his stubble-mulch stripcropping system is the answer.

"I am concerned when my seedbed starts drifting across the road," he said. "It is a loss I cannot afford."

Conservation Cropping System Works

For Arizona Farmer

By Mervin H. Wallace and Walter E. Parsons

BETTER crops and fuller use of his limited supply of irrigation water are among the rewards Keith Carlton reaps from a long-established conservation soil-management cropping system on the 800 acres he farms in Arizona's Casa Grande Soil Conservation District in Pinal County.

When Carlton bought the 400 acres he operates with two farms he leases, the land needed leveling, and getting effective water penetration on the loam and clay loam soils was a problem. He promptly planted the entire farm to alfalfa, from 1947 to 1949, as a beginning for his conservation cropping system. Through the Casa Grande district, of which he has been a cooperator for many years, he has received technical help from the Soil Conservation Service on land leveling and field layout, irrigation system improvements, water management, and conservation problems related to the management of crops and soils.

His crop rotation consists of alfalfa 3 to 5 years and cotton 3 to 5 years, with 1 year of barley and grain sorghum, which returns a large amount of residue. He also grows Papago peas for green manure at every opportunity.

Field rough-tilled for preirrigation for 1961 cotton produced 3¼ bales an acre in 1960, first year out of alfalfa.

Carlton uses "rough tillage" when preparing his seedbeds, plowing with a moldboard when the soil is dry enough to turn up cloddy. Plowing depth, to a maximum of 15 inches, is varied each year, to avoid creating plowpans. After a 30- to-90-day aeration period, he floats once or twice, furrows out for irrigation, preirrigates, knocks down the ridges with a rotary mulcher, and plants. He holds his cultivations to a minimum. Cotton usually is cultivated six to nine times, depending upon the weed growth, though one cultivation for each irrigation ordinarily is enough.

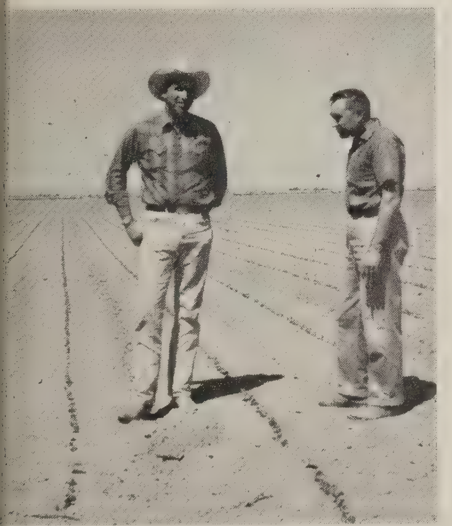
About 30 percent of the land in Pinal County is left idle each year because of water shortage, but Carlton is able to crop all of his land every year with water from small wells that produce 3,700 to 4,000 gallons a minute. He is able

Keith Carlton in 3-year-old Moapa alfalfa being pastured by sheep in February 1961 and to be rotated to cotton in 1962. Field yielded 10 tons of hay an acre in 1960, plus early-season sheep pasture.

Note:—The authors are, respectively, agronomist, Phoenix, Ariz., and work unit conservationist, Casa Grande, Ariz., both of the Soil Conservation Service.

) make his water reach so far be-
ause of precision leveling of all
xcept one 40-acre field, concrete
ning of all ditches, and diversifi-
ation of crops so that their com-
etition for water during peak
se periods is held to a minimum.
Carlton not only applies his
ater efficiently to the land, but,
ecause of his conservation crop-
ing system, the crops make the
ost efficient use of the water. For
otton, he applies about 18 acre-
ches of water during the preirri-
ation. This wets the soil to a depth
f 6 or 8 feet. The growing-season
rigations, of approximately 4
ches each, bring the season's
ater used on his cotton to a total
f 42 to 48 acre-inches, compared
the actual consumptive-use re-
uirement for cotton of only about
5 inches. Carlton, a director of
he Arizona Cotton Growers Asso-
iation, consistently raises close to
bales an acre, though Pinal is a
-bale cotton county.

His barley yields of 1½ to 2
ons and grain-sorghum yields of
tons or more likewise are well
bove the county average. In 1960,
e raised a small acreage of saf-
lower as an experimental substi-
ute for barley. The field gave him
net return of $46.12 an acre; so



Carlton's (left with SCS WUC Walter Parsons) conservation cropping system keeps soil in top condition for crops like this young 1961 cotton stand.

Field of Papago peas, planted in the fall and plowed under for green manure the next April on Carlton farm, being examined by SCS Soil Conservationist Ted Karns.

he increased the acreage to 80 acres in 1961.

Instead of following the usual practice of missing two cuttings by withholding the water during July and August, he irrigates his alfalfa straight through those months, and averages around 10 tons an acre, in addition to getting one or two pasturings for sheep in the spring.

Carlton will tell you the reason many of Pinal County farmers' cotton yields are dropping is that they overwork the land and do not keep the soil in good physical condition. He has demonstrated, for example, that water intake need not be a problem. Most of his fields are leveled to 1-percent irrigation grade and 1,320-foot runs, though some on the sandy loam soils are only 880 feet long. He is able to irrigate the clay loams with 6- to 8-hour sets, and the loams and sandy loams with 4- to 6-hour sets. He guards against irrigating too deeply, but has found that a small amount of deep penetration is beneficial in preventing salt accumulation in the root zone.

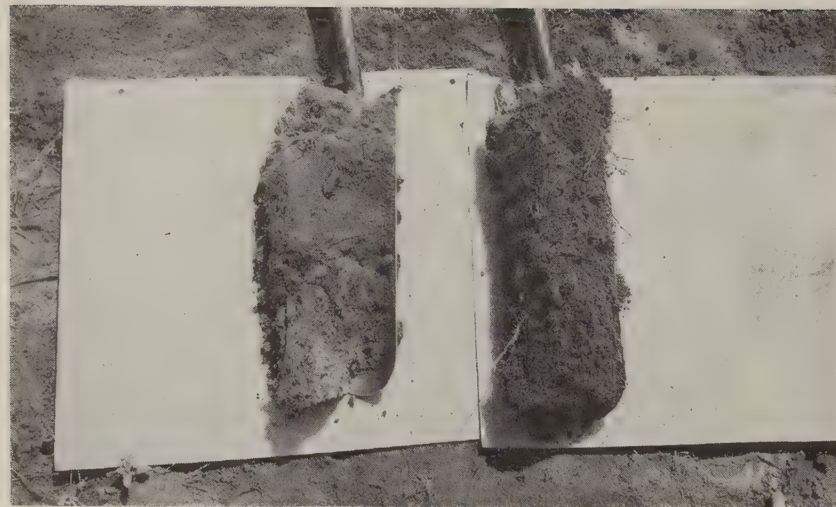
By rotating his crops and making use of green manure and all crop residues, Carlton also is able to cut down on the commercial fertilizers he uses regularly as needed. Together, the vegetative material and fertilizer are important in his soil management system.

"It is hard for farmers to make up their minds to get into this kind of system," Carlton observed after using his own conservation cropping system for 13 years. "The first 2 or 3 years they do well to break even. This is a long-time program, and many farmers do not make long-time plans. Me, I grew up on a farm and knew what a long-time program would do; so I started in as soon as I bought the farm. I wouldn't farm any other way."

He plans further improvements in his irrigation system, to make it still easier to carry out his soil and water conservation program.

◆

District Extension Forester Robert Raisch at Kansas State University lists four major sources of injury to windbreaks: Weed competition, insect-disease attacks, damage by livestock and rodents, and fire. Some precautionary measures he recommends are: A 15- to 20-foot fire lane, or isolation strip, to guard against fires; a clean isolation strip for outside row cultivation, to hold down weed growth; preventing soil compaction and grazing; and checking windbreaks every few days during the summer for insects.



Poor tilth (left); good tilth (right).

Spreading lime and fertilizer.

Crop-residue management.

Soil Manage

Conservati

By

1. Maintain Proper Air and W

Irrigation, drainage, timely tillage

2. Maintain Balanced Supply

Commercial fertilizer, barnyard m

3. Maintain Optimum Soil Re

Lime, gypsum, leaching

4. Maintain Proper Soil Tilth.

Crop residues, proper tillage, green

5. Reduce Runoff and Control

Contouring strip crops, terraces, g
ment, minimum tillage

6. Control Insects, Weeds, and

Crop rotation, timely tillage, chem

Cultural, management, and mecha
ing these principles. They must b
kinds of soil, as their full effects d
one another.

Note:—The author is head agron

t Principles

Cropland

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over crops, grasses and legumes

s, cover crops, residue manage-

ses.

, insecticides, fungicides

serve several objectives in apply-
right combinations for different
elationships and interactions with

ation Service, Washington, D. C.

Cover crops.

Stripcropping.

Grasses and legumes.

Mulch Tillage Stops Harvest-End Smoke Signals

By W. Lee Colburn

Corn planted in coastal bermuda sod on Lugoff farms, Kershaw (S. C.) SCD.

Recovery of coastal bermudagrass after last cultivatior

Cutting corn for silage. Planted with lister planter and cultivated twice.

Bermudagrass ready for grazing again. Note corn stubbl in grass.

A FEW years ago a sure sign that a farmer in the Coastal Plain of the Southeastern States had finished his small-grain harvest was a black cloud of smoke boiling toward the heavens and visible for miles.

Today, more and more soil conservation district farmers across the Coastal Plain complete their grain harvest and have another crop planted on the same land before anybody knows it. They burn no residues before planting—no smoke rises in the sky.

The reason for this change during the last 5 years or so has bee their adoption of mulch tillage, form of minimum tillage consistin of planting certain row crops i previous crop residues, cover crops

Note:—The author is area conservationis Soil Conservation Service, Bishopville, S.

r established sods without prior ınd preparation. A planting furow is made, and all material on he surface of the soil is moved to he row middle and covered.

Manager George Lachicotte of ugoff Farms in the Kershaw Soil Conservation District in central outh Carolina is a firm believer n this method of planting. The ugoff Farms operation consists of hree different types of farming—aising beef cattle, running a large airy herd, and growing row crops hat produce feed for the livestock.

"We know this method of planting and cultivating has many adantages over conventional planting and cultivating as used before nulch tillage was developed," achicotte said. "After trying this nethod of tillage, I wouldn't plant ome crops by any other method. Today we plant and cultivate over thousand acres by this method. This consists of corn in soybean tubble, soybeans in small-grain tubble, and corn for silage in rain stubble."

Last year, for the first time, achicotte planted ensilage corn in field of coastal bermudagrass sod, ısing the mulch-tillage method. This 50-acre field had been in coastl bermudagrass and grazed for he past 7 years. Lachicotte figured hat it had become slightly sodbound and needed renovating. Despite having to replant because of neavy rain and then a cool spell ıfter the first planting, he was well pleased with the results.

He applied 1 ton of lime and 400 pounds of 18-percent superphosphate to the acre before planting the corn with a 4-row, listertype planter, and used 500 pounds of 4-12-12 fertilizer an acre at the time of planting. The placement of fertilizer at time of planting is the main problem he has encountered, but he believes that with the equipment companies working on it, placement soon no longer will be a problem.

The corn was cultivated twice, with 125 units of nitrogen applied at the last cultivation. He was very careful not to disturb the sod in the middle during the first cultivation. The middle was leveled with the row when the second cultivation was made, leaving a nearly level field. The ensilage yield was about 18 tons an acre.

Three weeks after the ensilage was harvested, the coastal bermudagrass had made a complete recovery, and the beef herd was allowed to graze on it until frost. Today, the soil in the pasture is loose and friable, and the grass is more vigorous and abundant than ever.

Pointing out that the cost of each operation on the Lugoff Farms is carefully itemized and recorded, Lachicotte said the records showed a saving of $9.70 an acre in land preparation alone by using mulch tillage.

"Another advantage over conventional tillage," he explained, "is that this method permits us to plant our crops on time. A farming operation as large as ours means that we have to make the most efficient use possible of our tractors. By not having to prepare our land prior to planting, we can use the tractors that would be breaking land on some other job."

Other benefits from mulch tillage he has observed include: Conservation of moisture at planting time, less "lodging" of corn, and better grass and weed control. His yields from crops grown by the mulch-tillage method were equal to or better than from those grown by the old methods of cultivation.

Stubble Mulching

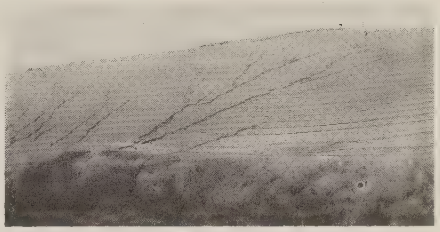
For California's Hillside Fields

By Adrien Kuffer

STUBBLE mulching holds promise of providing a solution to sheet-erosion problems on hillside fields in the Half Moon Bay area along the California coast.

Leastwise, that is the opinion of Elbert Marsh as a result of his experience in conservation farming of 2,000 acres of grain, flax, vetch, peas, and hay. He also has irrigated and dryland pastures used for feeding out replacement heifers. Marsh has learned that he can't afford to spend time reseeding and repairing eroded fields, if he is to plant and harvest on schedule.

For this reason, he has been working with directors of the San Mateo Soil Conservation District and Soil Conservation Service technicians assisting the district in de-



Early-fall stubble mulching is elminating sheet erosion like this in most cases.

veloping techniques of grain stubble mulching. This practice is designed to control the annual topsoil losses from water erosion and gullying when hillsides are farmed. This soil loss has been of great concern to the district directors.

Note:—The author is work unit conservationist, Soil Conservation Service, Half Moon Bay, Calif.

Elbert Marsh finds no erosion and new seedlings coming through after heavy rain on his cloddy, heavily straw-mulched field.

Actual measurements by Soil Conservation Service technicians have shown a soil loss of as much as 525 tons an acre on severely eroded areas. After 3 years of experience, Marsh has found that by using stubble mulching, his soil losses from high-intensity storms have been reduced to a minimum. He has been so impressed with the results that he increased his few mulched acres of the first year to 300 acres the second year, then to 650 acres this year.

Briefly, the reason for Marsh's interest in this practice is that, in addition to conserving his soil, he has been able to reduce considerably his equipment working hours and more nearly meet his planting schedules. He says that, by using the same tractor, he has been able to reduce the first operation by about half the time; that is, he uses a disk that works an acreage twice as great as the acreage worked by his plow. Then, too, because of the improved tilth of the soil, he finds that less power is required to prepare the seedbed and to do the seeding.

No weed problem has developed. The seedbed preparation technique he uses calls for disking just before seeding, to kill the young and germinating weeds. Marsh has found that the soil holds moisture better, that there is less packing, and that light rains are of greater benefit than where a clean seedbed is prepared.

Mulching as practiced on the Half Moon Bay coast requires no special machinery. Farmers are using the same equipment which has been used for their customary practice of land preparation and seeding—a disk for mulching and a drill and roller for seeding.

Marsh was selected by the San

Marsh (left) and SCS technician Howard Chipps deplore gullying and sediment at bottom of field clean-cultivated for seedbed.

Mateo district directors as Conservation Farmer of the Year for 1956, because of his continuing to practice and improve the technique of grain stubble mulching.

◆

Use Mulch

Extension Horticulturist E. C Wittmeyer, Ohio State University reports that mulching will do a better job of controlling weeds and reducing water-evaporation loss and runoff after heavy rains on some crops.

Rotted manure, partly decomposed compost, weathered sawdust and shavings, peat moss, and ground corncobs can be applied about 2 inches deep. Straw needs a deeper application. One inch of sawdust to reduce soil moisture may suffice, but the weed control may require more; and perennial grasses are difficult to control with mulch.

There may be a deficiency of available nitrogen when straw, shavings, sawdust, and ground corncobs decompose. Therefore, fertilizer such as 12-12-12 or equivalent, at the rate of about 1½ pounds, or ¾ pound of ammonium nitrate to 100 feet of row for rows 3 feet apart, may need to be applied several times, depending on the mulch and crop conditions.

Protecting the hills of Half Moon Bay, Bob Machado is disking across the slope and leaving a mulch cover of about 1,500 pounds of straw an acre.

Soil Management Boosts Wildlife

By E. R. Minnich

YOUNG E. B. Matthews of Lawrenceville, Va., discovered a new place for wildlife food and cover when he noticed in planting a 6-acre field to corn that one row was omitted in each terrace channel.

This was done in order to leave a strip 6 to 8 feet wide for waterflow during hard rains. He immediately decided that, as there were five well-distributed terraces in this field, this strip might be usable in his farm wildlife program, by preventing the terrace channel from washing and providing wildlife food and cover.

E. B. requested wildlife seed through his 4-H Club adviser and the Southside Soil Conservation District, and was furnished a few small bags of milo seed. After preparing a good seedbed, he seeded each terrace channel, broadcasting the seed to give thick, even distribution.

After the corn was harvested in early November, the cornstalks were cut into the ground with a disk, as a part of the seedbed preparation for small grain in the planned field rotation. E. B. asked the tractor operator to leave a couple of the cornstalk rows on each side of his milo strips, to add additional cover for the winter.

When the hunting season opened in the fall of 1960, E. B. got his dog and gun and set out to see the results of his terrace-channel wildlife strips. He was rewarded by finding three coveys of quail on his first visit to this 6-acre field Throughout the entire hunting season, each trip to the field yielded game.

The farm has a large number of terraced fields. When the land in these fields is plowed for a row crop like corn, a careful job of terrace maintenance always is done. The terraces on the steeper fields usually are difficult to combine. When hay follows small grain, the terraces are worked down to permit ease in haymaking. After these milo strips had served their purpose, the terraces were reworked and seeded to the same hay mixture as the rest of the field.

Food and cover for wildlife: Cowpeas in odd corner; Milo on terrace ridge; 1 row of corn; wheat in field. Result—3 covey of quail and other small game on the 10 acres.

The present-day land-use program in Brunswick County shows a trend toward more woodland. Quail and rabbit are increasing. The hunter's problem today is to find the game in areas suitable for good shooting. The terrace-channel strip-seeding idea placed into effect by Matthews served his wildlife program in two ways. It provided food and cover for the game, and at the same time placed it in a spot suitable for good shooting.

E. B. has many other good wildlife practices on his farm. He seeds annual game-bird mixtures in several patches along the powerlines that cross the farm. He seeds another annual mixture on the tobacco-plant beds after the crop has been planted. He has seeded a mixture of perennial grasses and legumes on the borders between the crop fields and woodland areas, and he seeds field peas and soybeans on many odd corners and short-row areas that are created in his contour-tillage operations.

Note:—The author is work unit conservationist, Soil Conservation Service, Lawrenceville, Va.

Kentucky Farmers Go for

Grass Cover Crops

By Walter J. Guernsey

SEEDING cover crops at the last cultivation of row crops is gaining favor with Kentucky farmers as it is with progressive farmers in other lower Corn Belt States. They like that extra growth they get before winter.

Cover crops have been seeded successfully at the last cultivation in corn, soybeans, grain sorghum, and truck crops.

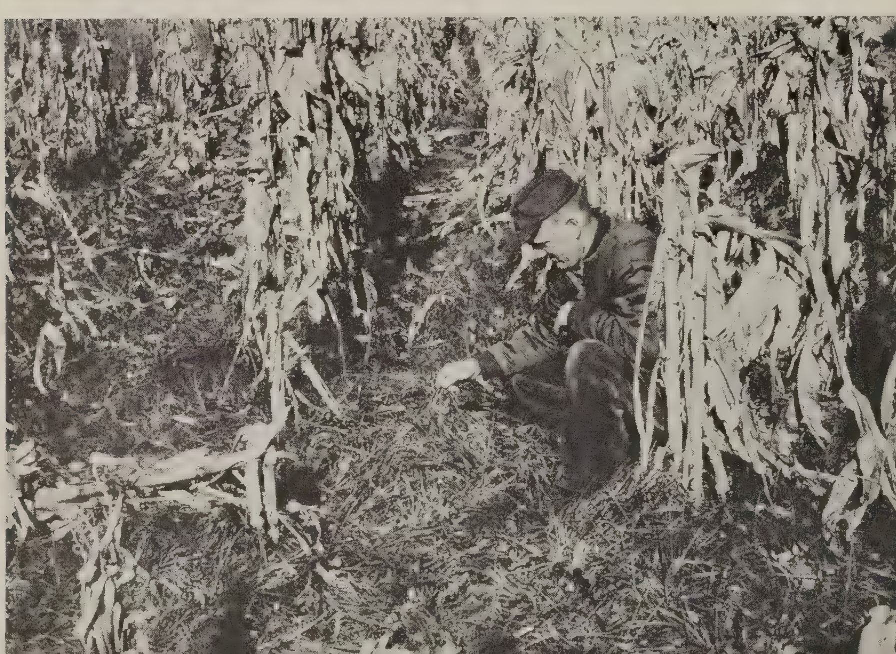
As early as 1953, quite a few farmers in western Kentucky were seeding KY-31 tall fescue successfully at the last cultivation of corn. Farmers in Livingston County and elsewhere planted fescue in standing corn with a cyclone seeder before the last cultivation, giving this cover crop several weeks' jump over those seeded after corn harvest. Annual ryegrass also has been planted successfully at the last corn cultivation.

Crop	*When sampled*	*Dry weight of roots in pounds per acre*
Field brome	Late spring, established previous summer or early fall	3,000-8,000
KY-31 tall fescue	Fall, second year	6,500
KY-31 tall fescue	Late spring, established previous summer or early fall	2,500-6,000
Oats, winter	At maturity	600
Rye	Bloom stage	2,000
Ryegrass	Late spring, after establishment in corn previous year	2,000-8,000
Vetch, hairy	Late spring, seeded previous fall	1,000
Wheat	Bloom stage	800

A cover crop regularly would be seeded after corn harvest, about October 20 to November 1, in thi area; but when it is seeded thi late, it makes very little growth and usually is damaged severel by freezing and thawing durin the winter. On the other hand KY-31 tall fescue seeded at th last cultivation has made from to 24 inches of top growth by De cember 1, depending on weathe conditions, site, and fertility. Th root system is correspondingly wel developed and may extend as much as 12 to 15 inches into the soil KY-31 tall fescue also is less sus ceptible to winterkilling than i ryegrass.

Another grass that shows prom ise in field tests in Kentucky i field brome, *Bromus arvensis*, a annual, which has been used wit success in other States like Massa chusetts, Ohio, Michigan, and In diana.

Small grains have been popula as winter cover and green manur crops for many years. However grasses produce several times mor pounds of roots in the upper



Fescue seeded at last cultivation of corn on Junior Morgan farm in Wolf County was 10 to 15 inches tall by November and improving soil tilth and structure.

Note:—The author is agronomist, Soil Conser vation Service, Lexington, Ky.

ıches of soil, the plow layer, than .o the small grains. The tabula- ıon shows data collected from dif- erent sources on the approximate ield of roots of various crops in he 8-inch plow layer.

Small grains likewise have not roved as satisfactory for seeding t the last cultivation of row crops s have grasses. This seeding date s earlier than normal for rye and ther winter grains, and they tend o become diseased and develop eed stems before cold weather, naking them more easily winter- illed.

There are other reasons why rasses are preferred over small rains:

Grass plants use large quantities f water when growing vigorously n the spring, 8 months after seed- ng. The larger the root system nd leaf-surface area, the more vater that is removed, and the arlier the land can be plowed Grass cover crops, because of their greater production of roots and ops, will help maintain and im- prove soil tilth or structure, add organic matter, and make the soil nore friable, or crumbly, and thus asier to work.

Grass seeds are smaller than hose of small grain; and, with nore plants to the square foot, combined with the natural spread- ng habits of grass plants, a better nd more complete ground cover esults, and erosion from raindrop splash is greatly reduced. On bot- om land subject to overflow, soil s protected by grass against scour- ng or surface erosion throughout he winter and early spring. Loss of fertilizer nutrients through eaching is kept to a minimum when the soil is covered with a vigorous grass cover crop.

Cover crops have been seeded successfully at the last cultivation on both bottom land and upland. Until recently, however, small grain was the winter cover crop most generally used, and small grain usually cannot withstand frequent or continuous flooding during the winter months, or for more than about 10 days. Rye- grass, on the other hand, can stand approximately 3 weeks of overflow without damage during the winter, if the water is moving. KY-31 tall fescue, under similar conditions, has withstood 5 to 6 weeks of flood- ing without damage.

By using this method, many acres of Kentucky's cropland that once remained bare through the winter season now are being pro- tected and improved.

Minimum Tillage

Licks "Goose-Drowners"

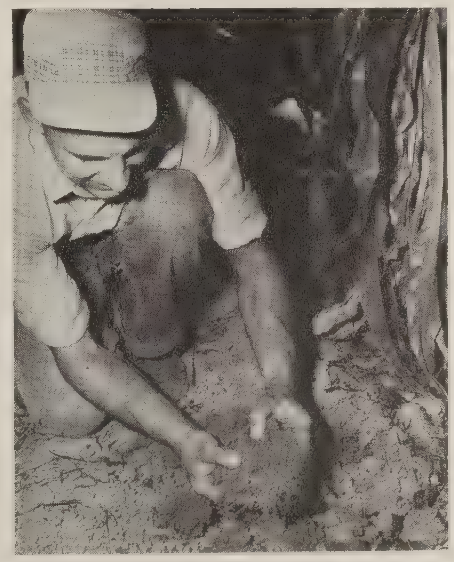
By Glen E. Bernath

SUMMER cloudbursts can leave northwestern Ohio's flat fields looking like rice paddies. That's fine for rice, but the main crops here are corn, soybeans, and toma- toes.

"We always had these summer goose-drowners," Paul Stockman, whose farm is near Napoleon, re- calls. "Now we have found a way to handle this water to our ad- vantage."

Stockman, a supervisor of the Henry County Soil Conservation District, and his son, Paul, Jr., farm 180 acres of this level, fertile soil, which has a high clay content and a constant tilth problem. Their land is typical of that in north- western Ohio and large sections of many midwestern States.

Ryegrass cover crop before minimum tillage. (Left to right: Paul Stock- man, Sr., Paul, Jr., and SCS WUC James Huff.)



Paul, Jr., likes feel of season-long fri- able soil in wheel-track planting in narrow-row corn trial.

The Stockmans decided to try wheel-track planting after reading that they could save $4 an acre in putting in crops. They did. Their biggest surprise though, was the elimination of the surface-water problem after the first heavy rain.

Note:—The author is agronomist, Soil Conser- vation Service, Defiance, Ohio.

The wheel-track planting left the surface soil in a condition that permitted rapid infiltration of water.

The real test was a rainstorm that left water standing for 24 hours on adjoining fields that had been planted in compacted soil with the customary tillage. After 1 hour, no water was standing on the wheel-track-planted field. Both fields are well tiled, but if the water can't get into the soil, the tile serves no purpose. Now, after using minimum tillage for 3 years, the Stockmans are convinced that their loose, open surface soil will take about any rainstorm the weather has to offer.

Minimum tillage is a principle: Work the soil as little as possible to obtain a satisfactory crop stand. The Stockmans wait until planting time, then do a good job of plowing. They have 4-row planting equipment, which requires setting the rear wheels of the tractor in, to 40 inches, putting extensions on the rear axles, and attaching two additional wheels. All of their row crops, about 100 acres of corn and soybeans, are planted with the wheel-track method.

Loose, open soil that takes in water from intense rainstorms.

Their minimum-tillage idea does not stop with the planting operation. Because they use pre-emergence weed spray, cultivation during the growing season has been reduced or eliminated. They grow cover crops on land that otherwise would be bare over winter.

Last year, the Stockmans entered the local 5-acre corn-yield contest. They wheel-track planted the corn, sprayed, and left the field until harvest. The corn yield was 120 bushels an acre, in the top yield range for these soils.

"We are completely sold on the benefits of minimum tillage," Stockman says. "In addition to higher yields with less labor now, we expect to realize long-time benefits from this practice in future years."

Wheel-track planting on the Stockman farm.

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A total of 10,248,000 pounds of grass and legume seed was exported from the U. S. in October 1960, the highest for any single month on record. Also, the total of 22,562,000 pounds shipped abroad from July through October exceeded all previous 4-month totals. Bigger October shipments to France, West Germany, the Netherlands, and Italy accounted for the increase.

◆

Seventy percent of the crop varieties now grown in the United States were unknown 20 years ago.

You Can Depend on

Orchards on the Level

By Joseph J. Voschin

BROTHERS Carlton and Howard Heritage have as their main objective raising top-quality fruit while building up the fertility of the soil on their farm in the Richwood orchard area of New Jersey's Gloucester County Soil Conservation District.

The Heritage brothers, along with their two sons, operate 180 acres, mostly in peaches. Howard and his son, Howard, Jr., have been doing all of the orchard work; because Carlton has his hands full as President of the New Jersey Farm Bureau, though his son, Reed, in high school, works on the farm summers and weekends.

The Heritage brothers' first contour orchard was laid out and established in 1945 when they became district cooperators. Since then, all new orchards on their sloping land also have been planted on the level.

Both brothers have observed that the water-holding capacity of the soil has increased tremendously over the years. They feel that the contouring, along with better use of fertilizer and cover crops, has brought about these good soil conditions. They figure that these benefits far outweigh the inconvenience of spraying the curved rows.

In 1957, during the worst drought recorded by the Weather Bureau in this area, they dug an irrigation reservoir. Water was applied at the rate of 10 gallons a minute for 5-hour periods before the portable pipe was moved, without any signs of soil movement. For the Aura soils on their farm, which have a notoriously low infiltration rate, this was exceptionally good performance and served to prove what good, long-term soil management can do.

Ed Clanding's peach orchard on the contour in Gloucester County, N. J.

Carlton Heritage has been replacing old straight-row peach-orchard plantings with rows on the contour for 20 years.

One of the Heritage contour-planted peach orchards, with alfalfa in the middles.

Widespread damage occurred in peach orchards in the county from the hurricane in the fall of 1960 and the very severe cold of this past winter; but there was little injury of any kind in the Heritage orchards.

''When it comes to feeding a tree,'' Howard senior pointed out, ''it's like playing a violin; it's a delicate operation. Soil tests are used as guides, but experience shows that some varieties require more and some less than what the test recommendations indicate.''

Every year, the Heritage brothers take out and replace 500 trees. With land values skyrocketing, they have been planting 108 trees to the acre instead of 87. This is being done to increase their production without buying additional land. Both Howard and Carlton

Note:—The author is work unit conservationist, Soil Conservation Service, Clayton, N. J.

feel that, with the use of good management practices and efficient use of water, the land easily will support the additional load.

"The contour-planted orchards on our sloping fields are remarkably uniform," Carlton said. "We believe this to be due to the even distribution of moisture."

They used ryegrass for winter cover until the fall of 1960. Then they tried barley, sown at the rate of 2 to 2½ bushels to the acre. Because it is more easily managed, Howard plans to continue using it. The cover is disked several times in the spring, and then the orchards are worked with a spring-tooth harrow through the summer.

"Weather conditions, especially the amount of rainfall, determine when we stop cultivation," Howard explained. "Generally, it is the latter part of August or early September."

During the picking season, the Heritages pack and hydrocool 400 to 800 bushels daily, depending upon how the fruit ripens.

Howard and Carlton joined in emphasizing that "Farming orchards on the contour on sloping fields may not show immediate returns; but, we have proven to our own satisfaction that it is a paying proposition."

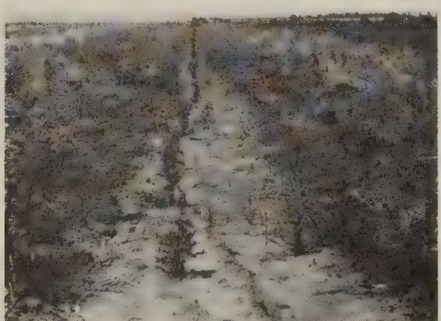
Chemicals vs. the Hoe

In Windbreak Plantations

By Walter T. Bagley

THE "man with the hoe" is disappearing from one of his last strongholds in the Great Plains—the tree-windbreak plantation. Our most successful tree plantings have been those which received timely weedings with the hoe in addition to tractor cultivation.

The advent of miracle chemicals brings hope that the problem of weeds in tree plantings may be solved otherwise, leaving trees free from their competitors for precious moisture, light, and nutrients. Certain herbicides have been developed, which, if properly used, will eliminate the unwanted weeds without injury to newly planted trees. On many sites, their use has increased tree survival and growth.



Chemical spraying completely controlled weeds in this red-cedar row in a Frontier County windbreak.

However, these herbicides can injure and kill trees; hence, an understanding of their limitations is necessary.

In order to assist tree-planting farmers in avoiding the pitfalls which may be encountered in the use of herbicides, soil and water conservation districts in Nebraska are cooperating with the Agricultural Experiment Station in establishing experimental plots. Soil Conservation Service and Extension Service personnel hold demonstrations of methods of herbicide applications and results.

The Frontier County district took the lead in 1960, by providing a sprayer and crew to apply herbicides to cooperators' tree plantings on a contract basis. The success of this operation has stimulated interest throughout the State. Local weed-control districts have been helpful in offering technical assistance and equipment for the program.

The most satisfactory weed control has been obtained with karmex and simazine. One application in the spring generally is enough for the entire growing season. These chemicals are relatively insoluble and leach slowly into the soil profile. Clay and organic matter slow the rate. This is one of the primary reasons why the herbicides can be used in tree plantations. Because the chemicals penetrate more deeply into sandy soils, they are more likely to cause tree injury on these sites. There also are indications that certain species can absorb more herbicides than others without injury. Apparently most trees escape injury because they absorb only small amounts of the chemical, because of their deep and spreading root system.

Herbicides should be applied only to the areas in plantings which normally require hoeing or special equipment for weed control. A band of chemical 3 to 4 feet wide, applied along the tree row, normally is sufficient. Conventional farm implements such as sweeps, spring-tooth harrows, and disks can be used to control the weeds between the rows, but the chemically treated area should not be disturbed. Herbicides can be applied in dry granular form, but spray application has been more successful.

Note:—The author is assistant professor, Department of Horticulture and Forestry, Nebraska Agricultural Experiment Station, Lincoln, Nebr.

Rice *Likes* Wet Feet

By Irving F. Pearce

A 5-year conservation plan on his farm in the South Sutter Soil Conservation District in California is credited by District Director Howard Van Dyke with enabling him to harvest 50 sacks of rice an acre where some of his neighbors get only 30.

Van Dyke, who also is on the Sutter County Agricultural Stabilization and Conservation Committee, owns and operates some 1,200 acres of rice, grain, and row-crop land in the Pleasant Grove area. His crops include rice, barley, wheat, alfalfa, beans, corn, sugar beets, tomatoes, and safflower. He not only has received top production in rice but also has had exceptional per-acre yields from his other crops.

It was 6 years ago that Van Dyke and his neighbors organized their soil conservation district. Technical help was given to district landowners, at the request of the district supervisors, by the Soil Conservation Service technicians, who helped Van Dyke develop a conservation plan for his farm. They mapped the soils and showed Van Dyke how he could use his land within its capabilities and according to its needs.

"In helping me prepare my plan," Van Dyke recalled, "the SCS technicians pointed out the value of many conservation practices, such as crop rotation, crop-residue utilization, green manure, subsoiling, improved irrigation, drainage, and land leveling.

"I found that planting rice or grain year after year is not good. My land requires a change of crops if I am to obtain top production. The main object in a conservation crop rotation is to have soil-improving crops that at least offset soil-depleting crops."

"Along with the rotation of my crops, I work all residues into the surface soil," Van Dyke explained. "I also plant vetch in the fall to be turned under in the spring for green manure. My land needs opening up at times to help break the plowsole; so I subsoil, which helps the roots and water to penetrate through the soil. I have leveled many acres and have constructed a lot of drain ditches."

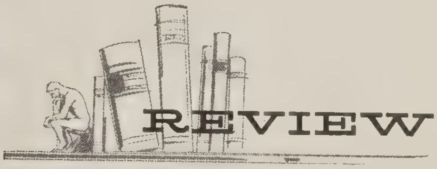
Observing that since the 88,000-acre South Sutter district was formed in March 1955, more soil and water conservation work has been done by the farmers than in any other comparable area of Sutter County, Van Dyke added:

"When this area obtains more irrigation water which will be impounded by the South Sutter Water District's Camp Far West project, the value of having a district and of being able to obtain technical assistance will be priceless. Assistance will be available to each landowner to help him determine the best method of distributing water over his farm; to show which way the land is to be tipped in leveling so as to fit into the over-all drainage plan; the percent of grade; how best to apply the water; and where to construct farm drainage ditches."

Van Dyke likes his conservation farm plan also because it outlines major items for as long as 5 years.

Note:—The author is work unit conservationist, Soil Conservation Service, Yuba City, Calif.

Rice growing under conservation water control in Sutter County, Calif.



SEEDS: The Yearbook of Agriculture. 591 pp. Illus. 1961 Washington, D. C.: U. S. Government Printing Office. $2.

The 1961 Yearbook of Agriculture describes seeds as the basis upon which a progressive agriculture rests, and as the source of most

of the nourishment which sustains human life. Most crops are grown from seed. New and improved crops are the result of plant breeding and production of quality seeds.

The new Yearbook deals with a subject that is closely related to those of such earlier yearbooks as "Grass," "Trees," and "Plant Diseases," and is a fitting companion to them. Sections dealing with "The Production of Seeds," "The Processing of Seeds," "The Certification of Seeds," and "The Testing of Seeds" describe the important elements that assure the farmer and rancher adequate supplies of high-quality seeds for producing the grain, the feed, and the forage they need to make a living.

The problems and solutions encountered in the production and harvesting of grass and legume seeds are well related, with practical suggestions to the grower of common and specialty seed crops, whether for feed or for conservation use.

Chapters presenting such subjects as seed drying, cleaning, processing, treating, and storing are of special interest to farmers and soil conservationists who know that quality seed is important in producing better crops and effective cover for the land.

Seed certification is essential to maintaining the superior qualities for which a selection or variety has been developed. Methods and certification standards to help maintain these desired qualities are described.

Seed testing has become a science. It furnishes the data for accurately defining, measuring, and labeling seed so that the purchaser may know what he buys, and recognize what good quality seed is. Regulatory measures and law enforcement help materially in bringing seeds of highest quality on the market, thus protecting the purchaser from buying inferior seed.

The numerous authors of the Yearbook are principally professional agriculturists. Appropriately included among them, however, are representatives of the seed trade. They call attention to the responsibilities of seedsmen and describe the four types of seed trade associations by means of which they serve the seed-using public.

The seed field is well covered; the style and appearance of the yearbook are impressive, though more illustrations would have been desirable.

—A. D. Stoesz

SOIL CONDITIONS AND PLANT GROWTH. By E. Walter Russell. 688 pp. Illus. 1961. 9th Edition. Longmans, Green & Co., Inc.: New York. $12.50.

The original book was written in 1912 by E. J. Russell, who was Director of the Rothamsted Experiment Station and later President of the British Association of Soil Science.

The newest edition continues the fine standard set by earlier editions of this widely known and often-quoted book. While this edition follows the general pattern of previous ones, several chapters have been revised or rewritten.

In comparing this edition with the 8th edition, it is noted that chapters V through XVI have been revised in order to reflect the advancements in technology that have taken place in the fields of soil and physical chemistry during the past 10 years.

In addition, the chapter on "Sources of Plant Nutrients in the Soil" has been expanded to include a thorough discussion on the value of phosphate fertilizers and their residual effects.

In the chapter dealing with general ecology of the soil population, the author has included a brief discussion on the use of herbicides and insecticides. It is pointed out that through continued use some chemicals remain in the soil and may build up to such concentrations that potatoes may be tainted. However, soil microorganisms are able to decompose these types of chemicals in nearly all cases.

For the most part, the remainder of the book has not been changed as the previous edition was completely revised. It is well documented and quotes from nearly 1,500 authors of scientific papers from many parts of the world. It is well written and easily understood. Students of agriculture interested in soils and plants will find this book a valuable reference.

—B. D. Blakel[illegible]

OCTOBER 1961

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

"When tillage begins, other arts follow. The farmers therefore are the founders of human civilization."

—DANIEL WEBSTER

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Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAM
Administrator, Soil Conservation Serv

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FRANK B. HARPER, Editor

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Technology and Machines Speed Conservation

By Donald A. Williams

ELSEWHERE in this issue is an article entitled "Plows To Fit the Land—Land To Fit the Plows." Although oversimplified, as headlines necessarily are, it does sum up a most important aspect of the revolution that has taken place in American agriculture during the last quarter of a century.

That has been the development and spread of soil and water conservation farming, which has experienced a revolution itself since its inception in the 1930's. Conservation technology is one of modern agriculture's scientific tools that we are fortunate in having perfected to help insure that our relatively fixed land area will continue to be able to support greater numbers of people despite growing competition for its use. Conservation technology has been so effective because it has kept pace with today's realities and tomorrow's needs—not those of yesterday.

Conservation today is not the same as it was even 25 years ago. Modern science and technology have changed the goals and methods of conservation greatly. Thus better understanding of soil and plant relationships enables conservation farmers to modify tillage and crop-management practices for greater efficiency and improved soil protection. Modern power and machinery make available an increasing variety of measures for erosion control, water conservation, preventing flooding, and reducing sedimentation. Today's conservation technology and machines make formerly impossible jobs possible!

When we started out in this new way of farming, horse-drawn equipment still most commonly used limited the earthmoving and other operations that now have such an important place in farm operations. With such limited power, it was not practicable, and in most cases not possible, to reshape field surfaces, convert big gullies to grassed waterways, build ponds and reservoirs large enough to hold amounts of water needed for livestock, irrigation, flood prevention, or fish and wildlife, or to do many other major soil and water management jobs.

Today's power for farm machinery is supplied generally by tractors, of sizes and types to fit every need. The number of tractors on United States farms increased about six times between 1930 and 1960, or from 2½ to 14 tractors for each 1,000 acres of harvested crops; while horses and mules decreased by more than six times, from 19.1 million to 3.1 million.

Tractor power brought the development of farm implements and earthmoving machines likewise designed to fit every need, including the performance of special conservation jobs. This ever-growing family of machines includes bulldozers and wheel scrapers; landplanes or levelers; terracers and subsoilers. It includes tillage and planting implements for more efficient and faster operations; forage harvesting machinery capable of handling expanded acreages of conservation crops; and machines for harvesting and processing grass and legume seed that formerly were gathered in limited amounts by hand, or not at all. In short, it includes machines for doing every kind of conservation job, from large-scale planting of trees to lining irrigation ditches with concrete.

Conservation technology obviously could not remain geared to the horse age. Mechanization, specialized farming, changes in land use, expanded use of chemicals, and other scientific aids to agriculture dictated new and improved approaches adapted to changing facilities and needs. Conservation soil management and cropping methods were improved upon, and structural designs were altered to take advantage of new opportunities for more effective soil and water conservation accomplishment.

Earthmoving rapidly became vastly more important in conservation planning and application. Especially significant was the opening of the way for conservation to move more effectively and faster beyond individual farm and ranch boundaries into the country's 8,300 small watersheds needing project-type treatment. Flood-prevention and other structures planned or completed in authorized projects to July 1 this year involved 206 million cubic yards of earth. Private contractors and farmers themselves have moved uncalculated additional millions of cubic yards on individual farms and ranches.

The current and emerging trends in agriculture point to the very probable need for more specialized services in soil and water management from both private and public sources in the future. These will include a yet higher level of technical competence and the broadest participation by every public and governmental interest concerned.

Land Leveling "Down East" in Maine

By LeRoy M. Bingham

LAND leveling has moved across the country out of the West "down East" into Maine.

This conservation land improvement practice is used in the West primarily to get the most efficient use of oftentimes limited water supplies for irrigation. Here, the main job for land grading is to get excess water off of pasture and hay land or to keep it from doing damage if it stays on the fields.

In the Androscoggin Valley Soil Conservation District in southwestern Maine, for example, where the land is gently rolling for the most part and farming is primarily dairying, it is imperative to have well-drained land to produce good pastures and hay. In many fields with drainage ditches, the surface is ridged and pocketed; and water stands in large areas until it evaporates, resulting in serious losses through delays in seedbed preparation and from drowning of moisture-sensitive plants. Land smoothing or land grading is a means of dealing with such problems of surface-drainage improvement. It smooths the field to eliminate the uneven surfaces, permits even distribution of water, and facilitates the construction of channels to handle excess flow.

Up to 3 years ago, there was always a waiting list of district cooperators wanting technical help in getting their fields and pastures put into shape to produce early grass and hay and dry enough to work with farm machinery. The need for some type of equipment to speed this work prompted investigation that resulted in the district's buying the first land leveler in Maine, late in 1957.

The machine proved to be so satisfactory on several jobs that year and in the full 1958 season's use that the district bought a second leveler, along with a $2\frac{1}{2}$-yard wheeled scraper, in 1959. At first, the leveler was used as a do-it-all, but experience showed the need for scrapers to do preliminary smoothing work and leave the levelers for the precision jobs. The district bought a second scraper in 1960, and a third in 1961.

Scrapers have many other uses beside moving dirt on land-smoothing and land-grading jobs where there are cuts and fills. They have been used to repair farm roads, f barnyards, fill gullies, cut and pla sod in waterways, spread tops in newly built outlets before see ing, and to build all types of ditch and waterways.

By combining cooperators' tra tors and time with the distri owned equipment, the cash cost earthmoving practices has been r duced materially in the Androsco gin Valley district.

The cost of bulldozer jobs 1957 was 47¢ a cubic yard for local earthmoving jobs. The co to district cooperators in 1959 f 7 earthmoving jobs with the scra ers was 16¢ a cubic yard, plus t costs of owning and operating t tractor and the operator's wag The total of all earthmoving cos for the scraper, including a tract

Earland Morrison using district land leveler before seeding field near Aubu Maine.

Note:—The author is work unit conservationist, Soil Conservation Service, Auburn, Maine.

'ewly completed land leveling on Harold Souther farm.

ıd operator at $4 an hour and raper rental at $2.50 an hour, as 41¢ a cubic yard.

Present rental of the machines, voted by the supervisors, is $2 ı hour, and a minimum of $10 a ay.

The cost of land smoothing, not precision job, but with some preminary survey work, averages $20 $25 an acre. Land grading, a recision job, averages $40 to $45 ı acre.

The best size tractor for hauling oth pieces of land-smoothing uipment is a 3-4 plow. Smaller actors have been used, but it takes nger to do the job. As farmers relace their tractors, they are getng larger ones with two-way hyraulic systems, in order to make etter use of this equipment.

Problem areas where this equipent is used usually have a field ope ranging from 0 to 4 percent. contour map is essential to the yout of the smoothing operation, pecially to locate ditches so that ater does not travel more than 00 feet; and it is important to do good job of engineering before onstruction starts. Checking is ecessary from time to time while ie job is being done. On fields ith grades under 1 percent, all ater entering the field should be itercepted and carried off by itching around the field.

By using land smoothing and land grading, a complete conservation job now can be done at one time, instead of piecemeal jobs. Roland Hemond, dairyman, Minot, was so impressed with the benefits of land smoothing that he bought a land leveler for himself.

Examples of successful results from land leveling in Androscoggin and Sagadahoc counties are the rule, not the exception. For instance, Charles Meade, district supervisor and dairy farmer of Auburn, increased hay production on a hard-to-work 15-acre field from only about a half a ton an acre to better than 3½ tons. At $5 a ton for standing hay, a $45-an-acre leveling cost has been repaid in a little more than 3 years.

By using conservation practices, including leveling of 18 acres with the district's machine, Harold Libby, South Auburn dairyman, was able to change the pattern of a flat, wet field from hard-to-farm narrow beds to easier to operate ditch spacing of at least 200 feet.

"We had no sooner finished seeding the field when a 6-day rain came," Libby reported. "After the rain, there was no water standing on it, and there had been no washing."

Libby was the moving force of a neighborhood group of six South Auburn farmers who clubbed together and bought a scraper in 1961.

The winter of 1958-59 in Maine caused a great deal of alfalfa winterkilling, but where the leveler had been used, there was little or no winterkilling. Harold Souther of Livermore, for example, had only 5 percent winterkilling on a 7-acre, land-graded field, compared with 90 percent kill on the rest of the farm, which, he said, "I'm going to level as fast as I can."

Long-time District Cooperator Nathan Morris of Turner, who was 1960 State of Maine and New England Green Pastures and Winter Program winner, is another satisfied user of the land leveler. By leveling in 1959 and 1960, he was able to solve his water-management problem and get his hay in early for good quality, because of the ease and smoothness of getting over the land with farm equipment in the spring.

After leveling 25 acres, Manager John White of one of Auburn's largest privately owned dairy's farming operations said: "We would not plant or seed a field without using the land leveler."

Advantages White listed include: Less operational and breakdown time consumed, and lower cost per acre; more comfortable, safer, and easier operation for such equipment as hay conditioners, tedders, balers, and wagons; opening of many fields to farming operations in wet seasons; elimination of wet spots that grow up to weeds and grasses; and improved yields of better forage.

As a result of this pioneer work in the Androscoggin Valley district, interest in land smoothing has developed throughout Maine. Four other districts now have levelers, two have scrapers, and several others are considering buying such equipment. The University of Maine at Orono leases a leveler from a manufacturer. A demonstration school, attended by district supervisors, 4-H Club members, Vocational Agriculture students, and others from all over the State, was held in the spring of 1959 on the farm of Supervisor Lionel Ferland at Poland.

Alfalfa seeding on leveled field 6 weeks later.

One Hay Crop Pays For Conservation Improvement

By Wayne Sanderson

IMPROVED water management enabled Wayne Luben to harvest more than 300 tons of high-quality hay last year as compared with only 187 tons of poor-quality hay produced in 1955 on his White River ranch in the Lower White River Soil Conservation District in Colorado. And he thinks he can double that yield by leveling part of his meadows.

The first year after Luben bought the ranch, he found his native hay meadows under 2 inches of water, and was always getting his equipment stuck in wet fields. What hay he could mow would not dry out. He was short of winter hay, and there was not enough spring-fall pasture to balance his operation. The previous owners had been plagued by the same problems and had sold the ranch rather than fight them any longer.

Soil Conservation Service technicians assisting the district figured that underground drains probably would be practicable. In 1956, Luben put in 4,600 feet of tile on approximately 100 acres. Cost of laying the tile from 4 to 9 feet deep was $5,400, including Agricultural Conservation Program cost-sharing.

The first summer after the work was done, it was possible to irrigate the meadows properly. Luben followed other SCS recommendations, including proper use of fertilizer and improved water application, all a part of a complete soil and water conservation plan. Each spring he overseeded with bromegrass and clover, until the forage composition gradually changed from sedge and rushes to highly palatab meadow grasses.

Modern machinery lets the womenfol in on the haying.

Last year, best in the history o the ranch, the increased hay yiel was more than enough to pay fo the entire improvement progran and Luben had adequate spring fall pasture to boot.

Note:—The author is range conservationist, Soil Conservation Service, Meeker, Colo.

Harvesting Wayne Luben's 300-ton hay with multiple equipment.

◆

"Horace Greeley, Esq., editor o the N. Y. *Tribune*, recently atten ed a trial of Plows and Mowers o the 7th of July last, at Guigne the 'Imperial' College of Agricu ture, some 25 miles west of Pari He says:—'A great number o Plows were tried here, and that o the Messrs. Howard, from Bedfor England, was pronounced the mo effective. There was no Plow e tered from our country, but o from Canada was tried and d good work . . .' "

—Scientific America August 18

Desert Spring Development—

Indian Ponies to Dozers

By Ralph E. Bishop

NOMADIC Indians are said to have discovered that water ould be obtained in desert footiills of the West by walking their onies back and forth at the foot f a rock ledge below a mesa or igh valley. Naturally impounded vater, leaking through fractures in he rock, came to the surface hrough compacted sand.

Time and drought years elimin-ted most of these seeps; but some f them, in favorable locations, still re usable sources of water in a ountry where no others exist.

Lewis Massie in the Borrego Val-ey Soil Conservation District is ne landowner who is using desert prings as the source of stockwater nd limited irrigation water supply o develop a small retirement ranch vhere he can keep a few head of attle, have a small orchard, and rovide an ideal environment for vildlife and recreation.

His 160-acre ranch lies in an solated valley in eastern San Diego County, Calif., between 4,000-foot high Montezuma Valley and 800-foot high Borrego Valley. Massie figured that 30 acres could be irrigated if he could find enough water. Seeps looked promising. Free water on the ground in a few locations and some marshy spots indicated leaks in the "bucket" formed by the Montezuma Valley above.

With help from the Borrego district, Massie went to work on the seeps. He and Soil Conservation Service technicians checked the wet spots, and prepared a farm plan calling for development of three of the most promising seeps and for building storage reservoirs.

Those early-day Indians undoubtedly would marvel at the white man's way of opening the seeps by using modern machinery and materials.

First, a small bulldozer leveled the site for a cutoff trench and concrete block reservoir. A half-moon-shaped trench was dug across the slope near the top of the seep area. Solid material was reached at a depth of 10 feet, and two spots were located to set 24-inch perforated pipe collector units. These were joined by closed tile to a distribution box at the lower end of the trench.

Two 1½-inch galvanized pipes carry water down the slope to a reservoir and a stock tank. Cross hookups are provided in the pipe system, to deliver water by gravity to either unit. The reservoir will be used to supply supplementary irrigation in the valley below when Massie's development is completed.

Two more seeps were developed above the homesite, using the same bulldozer-leveling and other techniques, except that no cutoff trench was needed. Perforated pipe carries the water to a concrete box, the difference in elevation providing the necessary pressure.

Total output is about 15 g.p.m. continuous flow, and it may get better after a few favorable rainfall years. The water is free, too, after taking off installation costs, which added up to about $1,-000, including those for pipe, labor, concrete block for the reservoir, and operation of machinery for excavation. Equivalent water bought from an irrigation district would cost $50 a month, or more.

Several more springs on the Massie property appear to be suitable for development. He plans on having enough water to provide a limited additional supply.

Note:—The author is work unit conservation-ist, Soil Conservation Service, Escondido, Calif.

Mrs. Johnnie Massie turns on desert spring.

Stock tank filled with seep water.

◆

The foundation of farm profits is soil fertility.

New Conservation Technologies Work In New State

By Archibald E. McCabe

BROTHERS Ernest and Jordan Ramos and young Clarence Gomes as their protege in the Mauna Kea Soil Conservation District can show mainlanders a thing or two about overcoming land-clearing and other difficulties to develop successful soil and water conservation ranch programs.

They operate on the Island of Hawaii in the semi-tropical east "Hamakua Coast" area, with its yearlong trade winds, rainfall varying from 60 inches a year along the ocean to 150 inches at 3,000-foot elevation, and deep, well-drained soils developed from volcanic ash (Humic Latosols). Nine plantations owned by three large companies are raising sugarcane on 72,000 of the district's 934,000 acres, and there are four livestock ranches with acreages of from 20,000 to 265,000 acres; but most of the land operators, like Clarence, live on small ranches and vegetable farms.

Note:—The author is work unit conservationist, Soil Conservation Service, Honokaa, Hawaii.

In the Polynesian days before their discovery by Captain James Cook in 1778, the Hawaiian Islands supported a lush growth of trees, ferns, and grasses, but few native species remain today. Cattle, sheep, and goats introduced by Captain George Vancouver in 1792 and protected against slaughter for 3(years by King Kamehameha destroyed the native vegetation i many sections. Next, large forestec acreages were cleared and plantec to sugarcane and other crops Trees, grasses, and shrubs tha later were introduced forced ou most of the remaining native vege tation, except for the koa tree, fron which the native Hawaiians mad their canoes, and the ohia (the red flowered "rain tree") in protectec forested areas.

When 8-year-old Clarence's fa ther died, the Gomes ranch land were not completely developed an could not provide the large famil a living. At 15, the Honokaa bo was living and working on th Ramos Brothers' ranch to help sup port his family while he attendec high school. From them he learnec about cattle ranching and the im portance of good conservation prac tices. He used his leisure time an spare money to develop the hom place, with the help of his brother and sisters.

Clarence Gomes and brother in Pangola grass paddock.

The Ramos Brothers' and Gome' ranches are in a section receivin about 120 inches of rainfall a year and are well suited for tropical pas tures. The Ramos ranch was onc a coffee plantation; but, when cof fee prices declined, the fields wer left unharvested and later clearec for pasture. While idle, the lan soon grew a dense stand of guav 10 to 15 feet tall, and it was neces sary to use crawler-type equipmen with dozer-rake attachments t clear it. The cleared land then wa

isked twice, allowing time between or organic material and grass resiue to decay.

The Ramos brothers planted all ieir pastures to pangola grass and g trefoil (Lotus uliginosus), and aze their pastures rotationally, ith 7 to 10 days on and 40 to 60 ays' rest. Paddocks are mowed ace or twice a year to remove vermature grass and to prevent ie return of brush.

By 1957, Clarence, turning 20, as ready to ask the Mauna Kea istrict for its Soil Conservation ervice technical help in working at a plan for the Gomes ranch, irt of which had been planted to kuyu by his father, with a good and now established. The rest of e Gomes land was in trees, brush, id poor Hilo, carpet, and rattail asses and would have to be eared, disked, and planted. There ere no division paddocks, and ere was a stockwater problem.

First, Gomes rented the Ramos' uipment for clearing and soil reparation. Then, with hardrned dollars, he bought $10-a-bag ngola grass, which he and his others and sisters planted on turdays and Sunday afternoons. xt, his plan called for introducig legumes. Again, with equipent help from the Ramos brothes, Clarence hit upon a unique ethod for establishing big trefoil d Desmodium intortum clover by rigging. He used a cultivating achine with a rolling coulter, folwed by a shoe-type plow to open e sod and to form contour furws in both the new pangola grass d in thick kikuyu sod. The spriging was followed by application nitrogen and phosphate fertilizr.

Everything grew, especially the ngola, which was waist high ien Clarence turned in his cattle. e trefoil and Desmodium intorm took hold and is spreading to eas between the sprigged strips. fter the home place was improved d ready for grazing, Clarence, a 58 champion bull rider, bought s entire cattle herd from savings, augmented by raising pigs at home.

Clearing guava on Jack Ramos land for planting Pangola-trefoil.

Probably most important is the management that Clarence is using. He subdivided the pasture into 3 paddocks, with the fences located so each has water from a running stream. Grazing is timed to provide the most palatable forage. Young Gomes usually buys weaners and sells the beef as long yearlings on the local market. His average stocking rate is one head to 1.3 acres, with gains averaging 1 to 1½ pounds a day. The stock also has access to molasses supplement yearlong.

Pangola grass pastures are especially popular throughout the islands, where this grass is adapted. Some of the large ranches, like the Princeville Ranch on the Island of Kauai, have improved on the old hand-sprigging methods of planting. This ranch bought a Bermuda sprig planter, attached fertilizer hoppers, and planted in well-prepared seedbeds. Recently, it successfully tried a new and more economical method of harvesting a field of mature pangola with a forage harvester, spreading the planting material with a manure spreader, and following up by broadcasting fertilizer and disking lightly.

Clarence Gomes doesn't claim to be the first or the most outstanding cooperator in Hawaii or in the Mauna Kea district. But he does know that many more acres can be made to produce considerably more for the local Hawaiian food market than they are producing now—with hard work, district technical help, and encouragement and help from family and friendly neighbors such as the Brothers Ramos.

Highways to Dam Floodwaters

An agreement to use State highways as dams for impounding floodwater where it is feasible to do so has been entered into by the Kansas State Highway Commission and the Kansas State Soil Conservation Committee. When a highway is to be built through or in a county, the Commission will notify the State Soil Conservation Service office, which then will inform the soil conservation district board in the county. From then on, all arrangements and agreements will be between the local district and the highway commission.

Made-Over Machines Work

By Gerald M. Darby

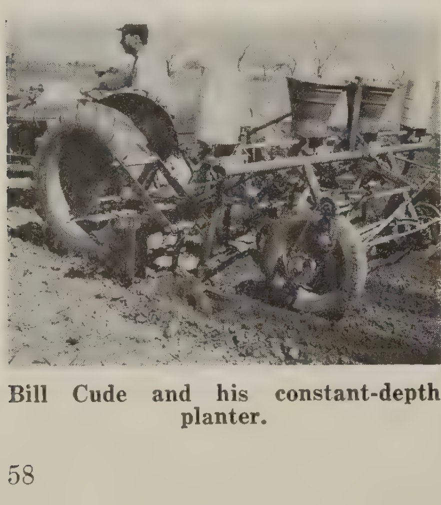
YOU can't top the American conservation farmer for ingenuity in devising special machinery to meet his needs.

Take, for instance, William Cude, the Bee Soil Conservation District's outstanding farmer for 1960. Cude's 4-row tool bar planter, which did a fine job on level land, did not plant to his satisfaction on terraced or uneven land.

Cude went to work and came up with a planter with each drill foot on a flexible coupling linked with its neighbor by cables and pulleys. When one foot is raised by an uneven place, the cables put compensating downward pressure on each of the others. That way, Cude gets a uniform planting job, no matter how rough the land.

Calvin Karr of Sinton, in the Gulf Coastal Bend section, modified his lister plow so it would do an extra operation. He added a tool bar and put four solid sweeps on the front bar. To the rear tool bar he attached three listers. With this rig, he undercuts grain sorghum stubble and re-forms the land in a single operation. Karr believes in as few tillage operations as you can get by with, to cut costs, save moisture, and keep the soil in better condition.

Note:—The author is agronomist, Soil Conservation Service, Austin, Tex.



Bill Cude and his constant-depth planter.

At the Picosa farm south of San Antonio, employees adapted a potato harvester for gathering and loading roots of bermudagrass, which has become one of the important conservation plants in most of Texas. Roots are planted by the thousands of tons each year in developing high-yielding pastures. Bermudagrass harvesting still is a 5-part job in most places. On the Picosa farm it involves only three operations: Mowing the grass, raking the hay, and digging the roots and loading them in a single operation with the made-over harvester while they are at their best.

Harvesting coastal bermudagrass with potato harvester.

At two plant materials centers operated by the Texas Agricultural Experiment Station in cooperation with the Soil Conservation Service, employees needed an implement to cut and collect grass seedheads in one operation. James E. Smith, Jr., helped to make over a damaged combine for the task. The station crew took off everything except reel, bats, sickle, feeder canvases, engine, and wheels. They added a big dump bucket. This did the jo

Calvin Karr's "tandem lister."

These are only a few of the e amples of the Texas conservatio farmers' and technicians' kna for improvising equipment wi which to get the conservation j done. Farmers frequently find necessary to improvise machines this type to meet immediate neec even though machines which w do the same thing may be availat commercially, because they are n available to the individual at t time.

◆

A yield of 100 bushels of cor plus the stalks producing it, co tains about 160 pounds of nitroge 60 pounds of phosphate, and 1 pounds of potash. Part of this c be supplied by the soil, b the farmer should put back into t soil at least as much phosphate a potash as he takes away in cro harvested. The most effective w to determine fertility needs is a soil test.

In spite of the general trend U.S. farmers to use greater amou of fertilizer, there is considera evidence that they do not u amounts that would give them hig est returns.

Picking Rocks Easier With Steel Fingers

By Edward Konieczny

OWERFUL stone rakes with strong steel teeth or ''fingers'' re saving wear and tear on human ngers in the traditional chore of cking stones from New England elds.

Such modern machine methods doing the major part of this ack-breaking job that faced the arlier settlers and succeeding genrations of farmers on the hilly, ony soils of this area have become creasingly necessary in recent ears of conservation farming with s emphasis on growing improved rasses and legumes for pasture nd hay. The land must be workble so it can be plowed, fertilized, nd seeded.

As Manager Robert Potter of aymond Flagg's 150-acre Green ill Dairy Farm in Gill, Mass., uts it, ''Pasture is only as good s you make it.''

Eight years ago, they decided to nprove 20 acres of unproductive asture as part of their soil conrvation plan worked out with the ranklin Soil Conservation District. Soil Conservation Service chnicians confirmed that the soil n the pasture was a good legume and grass soil, but stones were the chief obstacle to preparing a seedbed for growing alfalfa and Ladino clover.

ote:—The author is work unit conservation-t, Soil Conservation Service, Greenfield, Mass.

lfalfa and Ladino clover on rock-free pasture.

A private contractor with a 20-ton tractor equipped with a ''rock rake'' was hired to clear the rocks from 5 acres of the stony pasture. The clearing operation could be compared to mowing a hayfield, as the tractor lowered its rock rake and combed out the stones a swath at a time. Those removed on land adjacent to the roadway were buried, to avoid leaving unsightly piles of rock, and the others were placed along existing stone walls.

Potter said that part was easy; the hard job was still having to handpick the stones that slipped out between the teeth of the rock rake.

After the land was cleared of rock, lime and fertilizer were applied, and the pasture was seeded to rye. The rye helped to smother weeds, provide almost immediate feed for the cows, and smooth the roughened land surface. After the cows harvested the rye, an alfalfa, Ladino clover, timothy mixture was seeded. The result was four times more excellent quality pasture than this land previously produced.

Additional acreage was cleared each year until the 20-acre field was completed. The pasture then was subdivided into 4-acre lots for rotation grazing, and now supplies excellent feed for 50 dairy cows. When they have grazed one of the lots, the pasture is mowed and fertilized, to keep young, succulent plants growing for additional feed.

Flagg likes the conservation pasture improvement because, when the high-quality legumes and grasses run out, the field can be

One type of rock-combing equipment.

prepared for reseeding without interference from stones; farm equipment can work the field easily and without breakage; and high-quality pasturage keeps milk production at a high level. Instead of picking around hardhack, juniper, and moss growing among stones, his cows now can eat their fill in improved pasture.

Stripcropping

The Agricultural Research Service and the Virginia Polytechnic Institute have concluded that contour strip-cropping, as of corn alternated with grass and small grains, is one of the most potent weapons in the fight against soil erosion.

Their studies on water and runoff rates were started in 1939 on a 19-acre tract at Blacksburg, Va. Stripcropped, this area had a runoff rate of 34.5 cubic feet of water a second, when exposed to rains measured at the rate of 6.6 inches an hour. When row-cropped, not on the contour, and exposed to rainfall of only 2.2 inches an hour, or only one-third the amount on the stripcropped land, the runoff amounted to 37 cubic feet of water a second.

Plows To Fit the Lan

By (

WHEN the first plowing match in the United States was held in Illinois in the late 1870's the prize went to the plowman who could turn the straightest furrow on level land or up hill and down. His plow was drawn by horses.

It was to be nearly half a century before tractor power was to start coming into any general use—on only 3½ percent of the country's farms as recently as 1920. And it was to be another two decades before enough American farmers had learned to work with the land, not against it, that contour-plowing competition was introduced into the by that time traditional matches of skill on plowing-contest fields.

We have come so far in fitting our tillage and other implements to the land since the 1870's, since the 1920's, and even since the 1940's, that it is hard for conservationists and progressive farmers in the sixties to remember that it was not always thus. A less recognized fact is that while we have been fitting our tillage and other farm machinery to the land, we also have been in still more recent years shaping our land more and more to multiple-row and other modern farm machinery. It has been a two-way evolution.

From the earliest days of the soil and water conservation movement in the early 1930's, there has been the closest possible relationship between the tillage and other farm practices which farmers found it to their advantage to adopt and the machines they used to till and plant the land.

The first decade of Soil Conservation Service's operations was more or less a period of inventory taking, during which the need for change in tillage practices was analyzed. Many were tried out on erosion-control demonstration project, Civilian Conservation Corps, and early soil conservation district cooperators' farms, and on State and Federal experiment stations, to learn what needed to be done to land to control erosion. Many early practices were found ineffective or impracticable. Others showed promise and went through a gradual process of improvement and adaptation to crops and to soils, as well as to farmers' operationa needs.

In this process, it was inevitabl that we should find, as we did a the LaCrosse, Wis. Cooperativ Erosion Control Experiment Sta tion and elsewhere, that the farr machines which long had met th needs for conventional practice were not nearly as adapted to th new conservation practices as the needed and eventually had to b

Thus the needs of soils for pr tection from erosion, the prote tion afforded by new or modifie tillage practices, and the operatin characteristics of machines nece sary to make those practices pra tical all were analyzed.

Terraces, stripcropping, and co tour farming all dated back to th

Mule power.

Note:—The author is head of the administrative services division, Soil Conservation Service, Washington, D. C., and formerly was research engineer and conservation equipment specialist, successively.

...and To Fit the Plows

...y...rson

...ays of animal-drawn small equip... ...ent. Narrow, crooked terraces or ...rips had not been a serious im... ...ediment to that kind of farm ma... ...hinery.

Problems which arose as we ...assed out of the period of inven... ...ory taking, and the effectiveness ...f new practices, began to be evi... ...ent. An important contributing ...actor was the highly mechanized, ...ewly efficient agriculture which ...eveloped during the World War ...I period. Increased farm produc... ...ion and the erosion damages which ...esulted intensified the need for ...onservation, and more and more ...armers adopted conservation sys... ...ems.

Hundreds of thousands of miles ...f terraces were built, grassed waterways were established as terrace outlets and to control gullies, and more and narrower strips were installed. Mulch tillage, better sod-based rotations, and many other measures began to come into use. In the meantime farm machines had grown bigger, and tractors more powerful and faster, but they still needed to be better adapted to conservation farm operations for which they as yet were not designed.

Drastic changes both in farm machinery and in conservation practices were made by the early fifties. Terrace design had to be altered so the new implements could be used on terraced fields. The curves in strips and contour operations likewise were softened considerably. Various other improvements were worked out to make it practicable for the farmer to use his new machinery on conservation-treated fields.

Tractor power.

Farm machines themselves also underwent a great change during this period. Even though it was likely that hydraulic controls, mounted equipment, and more versatile tillage tools all eventually would have found their place, because of their labor saving characteristics, the need for protecting grassed waterways almost certainly brought about earlier adoption of hydraulic controls. Field cultivators which would operate through crop residues and still perform needed tillage operations without clogging became common. Farming of terraced fields was a factor in bringing about the use of mounted equipment providing more precise control on side hills and in curved rows.

Over the years, the SCS and the farm equipment industry have cooperated in studying problems of developing machinery to meet the needs of conservation farmers. A Dealer-District Program initiated several years ago was effective in bringing about a better understanding by dealers and manufacturers of problems of district farmers in applying conservation on their land, and by both farmers and dealers of the adaptability of their equipment to conservation farming.

Later on, terraces were modified still further to provide side slopes which fit the multiple-row equipment in common use by that time. Still later, as we learned how to modify terrace shapes and aline-

ments, we could move field soil without destroying its productivity, thus making possible the development of parallel terraces. Terrace spacings were arranged to fit a multiple of the width of the machine selected. The shape of the terrace was adapted to the machine the farmer planned to use.

Land-leveling, land-smoothing, or land-forming operations originated in the irrigated areas as a means of distributing irrigation water more efficiently. Farmers in the humid areas soon learned that smoothed fields also resulted in better surface drainage, and leveling became an increasingly common practice for this water-management purpose. Soon after other farmers learned that this operation would permit them to utilize the speed now built into farm machinery more effectively and to use wider machines, land leveling became a common practice in many areas across the country. It now is possible for a farmer to reshape his land to adapt it more fully to the kind of farm operations he chooses to follow, permitting him to utilize speed and efficiency built into modern farm machinery. Along with his more efficient tillage operations, he can develop a fertility program adapted to the needs of his soils and crops, thereby completing the cycle of fully adapting both the machines and conservation practices to the needs of the soil and most efficient and economical farm operation.

These conservation developments have given rise to the need for tremendous earthmoving operations in agriculture. Although farmers have tractor power and the equipment to build terraces, dig farm ponds, shape waterways, and to perform many of the other conservation earthmoving operations, many have found it more economical to hire earthmoving contractors while they themselves concentrate on their regular farming operations.

To meet this need, a large number of farm earthmoving or land-improvement contractors, equipped to do the hitherto unthought-of or "impossible" jobs now so commonplace, have moved into the conservation field within the last 10 years or so. Although they are mostly 1- or 2-machine operators, at least when they start out, some have sizable outfits with various types of equipment. It is not known how many conservation contractors are operating at any one time, but it is believed there are about 20,000 small contractors in agricultura[l] earthmoving alone.

In view of the magnitude of th[e] job ahead, it is expected this wil[l] be an active field for years to come. SCS records show, for example, that farm earthmoving jobs alone have involved approximately 50[0] million cubic yards annually fo[r] the past several years, not including work in flood-prevention programs.

"You Can't Level That Land"

But Idaho Farmer Did

By Eugene F. Crisman

"YOU can't level that land!"

That is what Wayne Naugle of Nampa, Idaho, heard from all the oldtimers when he bought a 240-acre farm in the Boise River bottom, but he had other ideas. After starting work on the farm in 1957, however, he wasn't too sure that the oldtimers were not right.

"I almost bit off more than I could chew," Naugle admitted later.

Because the land largely is rough, shallow, gravelly, wet, and salty, most of this area lies exactly as it did when first taken out of sagebrush in the late 1800's. When th[e] brush was cleared, ditches were ru[n] on the ridges, and the water wa[s] spread until volunteer bluegras[s] came up.

Naugle originally leased the far[m] in 1955, but after two years o[f] irrigating he decided it needed con[-]siderable improvement to increas[e] the carrying capacity and decreas[e] irrigation problems. These include[d] elimination of low areas of stag[-]nant water that were breeding spo[ts] for snails which cause liver fluk[e] in cattle. He decided it would b[e] far better to buy the land and im[-]prove it the way he wanted it.

Note:—The author is work unit conservationist, Soil Conservation Service, Nampa, Idaho.

This is what most of Naugle's 24-acre farm looked like before leveling.

augle inspects ditch before it is lined.

Working through the South Can-
on Soil Conservation District, of
hich he is a director, Naugle drew
pon the assistance of Soil Conser-
ation Service technicians in lay-
ng out his farm. Land leveling and
rainage were the two big problems.

Leveling was needed to get rid
f the gravel bars and to smooth up
he land so the salts could be
ushed out. Drainage was neces-
ary to get the water out of the
ow areas. Because of the large
mount of work to be done, Naugle
ecided it would be cheaper to buy
bulldozer and carryall, do the
ork, and then sell them.

The first gravel bar Naugle and
is helpers attempted to move
urned into a four-week job, for the
riginal area covered about six
cres. The gravel was spread in
he low, wet areas that were difficult to work; and when these were filled, trenches were dug down to gravel in the deeper soil. The good soil was stockpiled, and the trenches were filled with more gravel, after which about 12 inches of soil was respread over the gravel. The same process was used in undercutting the other gravel bars and bringing them back up to grade.

By 1959, Naugle had leveled 100 acres and dug 1¾ miles of open drains with SCS engineering help made available through his soil conservation district.

When the leveling and drainage had been completed, the job actually had just started, however; for then came the tedious task of establishing a good pasture grass on the salty soil. With the water table lowered, the soil was flushed of as much salt as possible before seeding. Then the grass was seeded at the rate of 16 pounds an acre. The land was irrigated frequently but lightly until the grass was established.

The upshot was that Naugle then had a pasture consisting of ladino clover, smooth bromegrass, orchardgrass, and alta fescue that would make any man envious. Forty acres were seeded in 1957, 15 acres in 1958, and 95 acres in 1959, with 35 acres more planned to be seeded, for a total of 185 acres of improved pasture. The remaining 50 acres will be left in native bluegrass for the cattle to feed on in the winter. Naugle planned to run about 350 head of cattle on the farm. When he bought the land, it would barely support 150 head!

Pasture of bromegrass, orchardgrass, alta fescue, and ladino clover after water management and leveling work was completed.

A well-planned pasture management and fertilizer program has helped make this production possible. All manure is spread on the pastures, and check plots are used to determine how much commercial fertilizer is needed for best results.

Naugle's plans called for building concrete-lined ditches along the heads of the fields to reduce water loss and facilitate irrigation, and installing gates in the ditches for border irrigation.

Lining a ditch with concrete 2½ inches thick to prevent winter cracking.

All hay and ensilage will be raised on Naugle's other farms; so no feed will have to be bought, and this entire farm can be used for pasture.

"Sure it cost a lot," Naugle said, "but even if I add up the original price and all the money I spent on it, I could sell the farm for more today than I have invested. Besides, if I hadn't done it, where could I get pasture as good as this?"

◆

West Berlin's 1,500 horse population is reported increasing 3 percent a year.

South Dakota Earth Moved in Year Would Build 30-Mile Dam

By C. D. Brehm

If all the earth moved by South Dakota's conservation farmers in 1960 could have been put in one pile it would have made a 30-mile-long dam 30 feet high and 165 feet wide at the base.

In other words, there were approximately 16 million cubic yards of earth moved, much of it with heavy equipment, in building stock-water ponds and dugouts, terraces and diversions, in water-spreading and water-management systems, and in land leveling for irrigation.

Farmers and ranchers cooperating with South Dakota's 67 soil conservation districts, with the help of Soil Conservation Service technicians assigned to them, consequently have become one of the largest earthmoving groups in the State. And they have only started.

More conservation work is being done each year, with increasing attention to terraces, with waterways. Terracing, to control soil erosion and make efficient use of moisture, is a relatively new general practice in South Dakota. It pays well, especially in dry years. South Dakota farmers are moving about 2 million cubic yards in their terrace building a year. Waterways, to carry surplus water without harm to natural stream courses, are a must with terrace systems. They involved some 400,000 cubic yards of earthmoving a year.

Water spreading on range is another conservation practice getting increased attention in the central and western parts of the State. Farmers and ranchers moved 300,000 cubic yards of earth in building water-spreading diversion dams and dikes, to make it possible for more water to soak into the grasslands and improve yields.

They also moved 12 million cubic yards in building stockwater dams and dugouts, to assure better water supplies for cattle and sheep, and supplemental supplies for irrigating hay crops. Detention and irrigation dams, irrigation ditches, and erosion-control work meant the

Building level terraces with elevate terracing machine on M. V. Klienjo farm in Brookings County.

moving of 750,000 cubic yards.

Another 550,000 cubic yard were moved in stepping up eff ciency on irrigated lands. Thi practice pays in uniform cro yields, in less waste of water, an in better disposal of excess wate

Conservation contractors hav played a major role in this conse vation earthmoving. Most of the own only two or three pieces o equipment, but they operate mos of the year. A considerable amoun of the work, of course, was don by the farmers and ranchers wit their own equipment. Equipmen includes tractors and carryall draglines, road patrols, terracer and bulldozers, as well as farme owned plows used in terracing.

The Great Plains Conservatio Program has accounted for a n ticeable amount of the quickene interest in western areas of th State. This program offers Feder

Martin Stovevik's level terraces in McCook County holding first spring's runoff water.

Note:—The author is State conservation eng neer, Soil Conservation Service, Huron, S. Da

st-sharing to help farmers and nchers do a faster job in getting mplete soil and water conserva-on on the land.

Drought in the Northern Plains 1961 and other years has caused any farmers to take more interest conservation, after observing at neighbors using soil and mois-re conservation practices have en able to make it through with ater and grass for their livestock. ructural and other measures in-lving earthmoving are among the opping, tillage, grass planting d management, tree windbreak anting, and other conservation actices they are using to help otect their land from drought or flood and to keep it fit for more stable production year after year.

Stockwater pond and good grass on Gruenwald Ranch, Beadle County.

Youth Conservation Is Watershed Project By-Product

By **Sellers Archer**

GIRL scouts from five north Georgia counties live it up in e summer because of a watershed otection and flood prevention oject developed on Sautee Creek landowners with Soil Conserva-on Service and Forest Service lp.

An 18-acre lake, which is used the Yonah Girl Scout Council rving 1,300 girls and 400 adults, one of five that will protect the acoochee Valley and its prosper-s farms from damaging floods at have averaged one a year. A ream of water flows out of a pipe der the earthen dam. When orms come, water now will rise ove the pipe opening that con-ols the normal pool level, and tomatically be released slowly ough that the stream below will ot overflow.

On the lake banks are the central ilding of Camp Echoee, a combination dining and assembly hall, PX, infirmary, warehouses, and other buildings. Scattered over the hillsides are camp units with tent and outdoor cooking and eating facilities. Canoes tie up to docks built out into the water, and swimming areas are fenced off. Land for the camp was donated by Dr. Austin Walters, a retired Navy doctor, after the watershed plan was completed and the flood-detention reservoir site was definitely located.

The camp director's staff includes a waterfront director, a dietitian, a registered nurse, and qualified teachers of campcraft and cooking, arts and crafts, Indian and nature lore, folk songs and dancing, and health and safety. The girls also have a chance to learn to fish, because bass and bream big enough to be caught have been stocked in all of the watershed lakes. The American Camping Association gives the group a high rating.

The 35-acre Lou Henry Hoover Memorial Wildlife Sanctuary, on adjacent national forest land, is under a 10-year development plan. Three miles down the road is Camp Sky Lake, which accommodates 200 Jewish boys and girls from all parts of the Nation. This lake rapidly was losing its capacity because of sedimentation until the watershed project was established. One of the flood-detention reservoirs is just above the camp. It protects the old lake and provides more water area for boating and fishing.

Girl Scouts enjoy swimming and canoeing behind watershed project dam.

ote:—The author is field information special-i, Soil Conservation Service, Spartanburg, C.

Strip-Mine Land *Can* Be Salvaged

By Encil Brohard

TO look at strip-mine land, you would think nothing would grow on it, as it very often doesn't. Such gouged-out land usually is left hard, dry, compact, sour, sandy, shaly, void of humus, and rocky—to name a few of its minus qualities. Yet, with all this, strip-mine land is interesting, unpredictable, fascinating, and promising of salvage for future productive use. Revegetation has been done in a variety of ways in the Northern Panhandle Soil Conservation District in West Virginia by the farmers and coal operators, with Soil Conservation Service technical help.

Sourness is a major problem. In some cases, where the soil was tested for acidity soon after being graded, it tested only moderately sour and was considered suitable for planting; but after it was exposed to the air and sun for a few weeks, the soil became very sour, because of oxidation of sulphur compounds. Any trees planted promptly died, and the area remained completely bare of vegetation, including even the hardiest weeds.

Note:—The author is work unit conservationist, Soil Conservation Service, Wellsburg, W. Va.

Contour furrowed strip-mine area and tree planting, with pond.

May seeding in July on Chill Reed farm, Colliers, W. Va.

As a result of these experiences, such areas commonly now are left unplanted until conditions for plant growth become more favorable; because, under normal conditions of moderate acidity, many kinds of weeds, locust, and other vegetation "seed in" to try to cover the strip spoil. To help combat this "sour" condition, only the top, or surface, is worked in preparing a seedbed. Where grass and legumes are to be planted, the seedbed is prepared by harrowing, rather than plowing, to avoid bringing acid soil to the surface. Because of poor structure, the soil usually is hard, dry, and compact after being leveled by a bulldozer, and trees grow more slowly on the leveled portions.

A "sweet" strip-mine spoil can be vegetated much more readily. There are a few areas in Brooke and Hancock Counties, for example, where, in the process of grading, the sweet, limestone soil was left on top. Where seeding was done on this type of spoil a successful stand of alfalfa and grasses usually resulted, with the application of 600 pounds of 10-10-10 fertilizer to the acre. In r[illegible] cases, volunteer clover stands [ap]pear on sweet spoil, making a good land cover.

The planting of trees usually is recommended. However, sweet spoil or slightly acid spoil occasionally is planted to legumes and grasses. Some spoil is too steep, rough, and rocky even for planting tree seedlings. Such areas [are] seeded, preferably with black locust and sericea lespedeza. Among the seedlings, locust, short-leaf pine, Scotch pine, and white pine have shown the most promise, with black locust making the most rapid growth. Autumn olive appears to be the most promising shrub, coupling fast growth and heavy production of fruit for wildlife.

Some of the areas in Brooke and

:ancock Counties have been con-
-ur furrowed for tree planting. ;ontour furrowing aids in the col-:ction and retention of moisture, ;sulting in faster growth. How-ver, the looseness of the soil some-mes causes too much soil to build p around the trees, resulting, in fect, in their being set too deep.

In one case, a detailed planting lan was prepared with the help f the Soil Conservation Service or the local soil conservation district; and in some cases, the landowner bought and set his own trees.

In other instances, the seeding or tree planting was done by the coal operators, using specifications from the Agricultural Experiment Station.

The present West Virginia strip-mine law requires the mine operator to obtain a satisfactory stand of plants. It also permits him to make use of soil conservation district services. It has been shown that coal can be mined and the land put back in such a shape for satisfactory production of hay and pasture. For example, Mike Starvaggie, near Weirton, set aside 13¢ for every ton of coal he stripped to a depth of 90 feet, to restore the land to a condition productive enough to farm. These "canyons" were filled and the land seeded to make it the show place of the State and one of the best in the entire Nation.

Representative Citizen

SOIL and water conservation comes naturally to versatile :dolph Hansen of Colorado.

As he puts it: "I was broken in) conservation, and had already :built two farms in Denmark be-ore coming to this country."

He also was on a committee of ırmers that started rural electrifi-ation on the island of Fyn in Den-ıark, from which country he came ı 1925 as one of several farmers rought to the United States by a eet sugar company. This is be-eved to have been the first coop-rative rural electrification in the orld. It was the approach used for ıter rural electrification through-ut Europe, and then by the Rural lectrification Administration in ıe United States.

Hansen, his wife, daughter, and wo sons were located on one of the ompany farms near Granada, 'olo. When the farm was sold to he United States Government in 942 for use as a wartime intern-ıent camp, the Hansens bought a arm 8 miles southwest of Las Ani-ıas. The house with which they tarted out was a stagecoach stop-ing point on the Santa Fe trail, nd will be 100 years old in 1963.

Their son, Niels, bought an adjoining farm, and now leases the elder Hansen's farm since Adolph's "retirement" in 1961 after 65 years of farming. Their other son,

Adolph Hansen.

Hans, is a chemical engineer, and daughter Karen is a medical doctor.

With a farm of their own, they started conservation and rebuilding in a big way. Three hundred acres had to have drainage rehabilitation before successful farming could be carried on. This conservation improvement was followed by land leveling and putting in a new irrigation system. The Purgatoire, or Picketwire, River began to move in on the land. This called for building 1½ miles of new river channel.

Hansen became a member of the board of supervisors of the Bent Soil Conservation District in 1943 and has served continuously ever since. While he was board president from 1953 to 1961, the Bent district became one of the most active districts in Colorado. In 1958, it built an agricultural building in Las Animas to house U. S. Department of Agriculture agencies operating in the county.

Hansen was active during the early years in getting the Southeast Colorado Association of Soil Conservation Districts started. This, in turn, led to organizing of the Colorado Association of Districts. He served on almost all of the State association committees.

From 1937 to 1942, he also was on the Farm Security Administration (now Farmers Home Administration) Advisory Committee for seven States, including Colorado, and served as a member of the Bent County FHA board. He

helped organize and was a charter director of the Production Credit Association in La Junta; was president of both the Prowers and Bent County Farm Bureaus and a State director of the Colorado Farm Bureau; and has been on the board of directors of the canal company serving his farm.

Hansen has taken his place in the history of his adopted State. He is listed as one of the "Representative Citizens of Colorado" in the recently published Historical Encyclopedia of Colorado.

—Carl R. Ward

Ditch Lining Saves Water—Pays

By Rex Ricketts

DURING the last 4 years 16 farmers and ranchers in the Fallon, Nev., area have had more than 24,000 feet of irrigation ditches concrete lined on their farms. They are cooperators in the Lahontan, Sheckler, and Stillwater soil conservation districts.

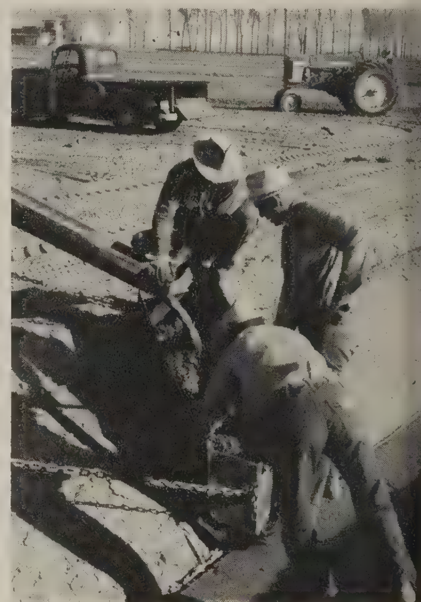
A large percentage of the soils on which farmers raise crops in the Lahontan Valley is sandy. Seepage losses from earth ditches constructed in those light-textured soils can run as high as 30 percent of the total irrigation water lost per mile of ditch. This water not only is lost for needed irrigation, but also adds to the ground-water table. In many cases crop yields are reduced and drainage becomes necessary.

Weeds in ditches are a never-ending problem in all irrigation farming areas, and much time and expense are involved in combating them. With seepage losses, weeds, and extremely flat ditch slopes, the delivery time for irrigation water from main canals to the fields is measured in hours rather than in minutes.

After checking around in other localities to find out how similar problems were overcome, farmers of the Fallon area decided concrete ditch lining was the answer.

Cyril Schank was one of the first farmers in the Fallon area to lin an irrigation ditch with concret Four years ago, 2,000 feet of co crete-lined ditch was installed b a contractor, using a slipform, at cost of $1.50 per foot. His old ditc took up a strip of land 2 rods, c 33 feet, wide. The new ditch, bank and all, is only 12 feet wide.

Note:—The author is engineer, Soil Conservation Service, Yerington, Nev.



Charlie Frey's homemade slipfor laying concrete on ditch side.

The irrigation time on the 4 acre field served by the ditch ha been cut in half. A tractor and dis were needed to clean out the o ditch before each irrigation. Th maintenance work required 1 hours of man and tractor tim Also, there now are no weeds an no breaks or washouts to conter with.

When the ditch was complete Schank thought it would take 2 3 years for the concrete lining pay for itself. Instead, he believ the ditch paid for itself in one yea That is because he was able to do better and more economical irrig tion job, and improve his per-ac crop yields accordingly.

Cutting the irrigation-water d livery time from 7 hours to le than 10 minutes is a significa achievement resulting from insta lation of 1,700 feet of concre ditch lining by Art Bevan, Fall

Graded and staked irrigation ditch before pouring concrete for lining.

Pouring and hand-spreading concrete in a ditch on Ralph Lattin farm.

rancher. Bevan has a 240-acre farm, with 150 acres planted. The old dirt channel ditch went through a sandy area where seepage losses were high, and weeds growing in the ditch slowed the water to a crawl.

As a result of putting in the slip-form-type concrete ditch lining, 3½ cubic feet per second can be delivered to his fields with no loss and no weed growth to worry about. The benefits derived from this lining will rapidly defray the installation cost of $2.90 a foot.

"It used to take 64 hours to irrigate my farm," Bevan said, "but now I get it all wet in 24 hours."

A unique homemade slipform for concrete ditch lining was developed by Charlie Frey. He poured 1,800 feet of ditch with it in only a few days. His ingenuity has paid off. The total cost for the concrete lining in place was only $1.70 a foot. A 2-foot ditch bottom was used for this particular ditch; but with slight modifications, any desired bottom width can be built.

As constructed, the lined ditch has a capacity of 30 cubic feet per second. It takes only 15 minutes to deliver water to his back fields. Previously it took several hours. Another ¾ mile will complete the lining program on Frey's 780 acres. When it is completed, water can be delivered rapidly to any part of the farm without loss.

Dennis Sorensen lined 700 feet of irrigation ditch with concrete. The cross section was trimmed to grade by hand, and the concrete lining was hand placed and smoothed. Labor, concrete, and equipment costs totaled $1.68 a foot. The completed ditch will carry 15 cubic feet per second. Seepage eliminated, a 100-foot-wide portion of the field adjacent to the ditch now raises good alfalfa where nothing of value grew before. Sorensen estimates that the hay crops from this field have been increased 10 percent. The ditch doesn't grow full of weeds and require cleaning just when Sorensen is busiest in

Section of 1,800 feet of concrete-lined ditch on Charlie Frey ranch. The ditch has 2-foot bottom and capacity of 30 c.f.s.

his hay fields.

Several gunnite and shotcrete linings also have been put in around Fallon. With these methods, the concrete mixture is sprayed on a preformed ditch section. Reinforcement can be used with this type of lining, which is desirable on many jobs. The cost of this lining is comparable to that of the other types.

More and more farmers in irrigated areas are realizing the benefits and values of ditch lining as an aid to using water efficiently and helping them to farm successfully.

Mechanical Post Peeler Leads To Good Land Use

By Richard L. Gray

A LOCALLY designed mechanical post peeler made it possible for ranchers in northeastern Wyoming's Buffalo-Belle Soil and Water Conservation District to convert unproductive Ponderosa pine thicket lands to income-producing areas of their ranch units.

There are many acres of such thick Ponderosa pine stands in this Black Hills area. The owners of these lands have become increasingly concerned over their use, because in their grownup state they provide very limited grazing, and the trees don't grow large enough to log for sawtimber. The result is nonproductive areas on ranches that need all the income possible to make them pay, for most of these ranches are barely large enough for economical operation.

Realizing it would be a real help if these thicket areas could be made to produce, the ranchers considered many ideas and suggestions. Some

Note:—The author is work unit conservationist, Soil Conservation Service, Moorcroft, Wyo.

The mechanical post peeler.

even have run a bulldozer through the thickest places; but this operation leaves large piles of broken up trees to decay, and exposes slopes to wind and water erosion.

Most ranchers could see that posts and poles, for which there is a continuing good market, were the only possible crop they could harvest from this land. Some got out their axes and cut a few trees, usually in no pattern except to take everything usable. Then they took the spade and peeled them. But these laborious hand operations were enough to discourage even the most determined among them.

Unwilling to give up, a group of four district ranchers southwest of Sundance—Kenneth Canfield, Joe Beal, Herbert Finch, and Bob Pearson—decided to see if they couldn't get over the stumbling block of peeling the posts. They took their problem to a local machinist, Merle Sisson, who came up with a design for a mechanical peeler, costing about $600.

After it was built, the four ranchers cut some posts with a chain saw to see if the peeler would work. It did. They then had a chance to sell the machine, at a profit, to a commercial post company over in South Dakota. They promptly had the machinist build them a new and improved peeler.

They still are using this one, which has peeled thousands of posts and poles. They have peeled all they needed themselves and have helped their neighbors. The local telephone company people got together and, in one day, cut, skidded, peeled, and piled 375 poles for a new line to all the ranchers for a new dial system. One rancher later treated all the poles with penta, the method of preventative treatment the ranchers now use, after trying crankcase oil unsuccessfully when they started out.

Sisson has built several machines for commercial peelers in South Dakota and northeastern Wyoming. These peeling machines are driven by tractors or portable engines. The whole unit can be loaded onto a pickup truck and moved anywhere easily.

The peeling is done by a lathe-type cutting knife, which has adjustable depth of cut. Posts or poles are fed through by two rubber tires at a speed governed by the feed handle. Two carts, one on each side, hold the pole or post steady during its turning action while it is going through the machine. It takes three or four men to keep the peeling rig operating at full capacity.

This locally developed tool has led the way to economic land use through a practical conservation practice on these Wyoming woodlands. As a result, the ranchers are able to harvest a crop while doing the thinning that pays them for their time, results in faster growth for the trees that are left, and avoids thicket clearing by bulldozing or other means leaving the land in condition to erode.

Commercial post-peeling machines also are on the market.

◆

The Soil Science Society of America observes its 25th anniversary at the annual meeting of the American Society of Agronomy and Soil Science Society of America in St. Louis, Mo., November 27-30. Dr. Charles Kellogg, assistant administrator for soil survey, Soil Conservation Service, will review the history of the Society at the meeting.

◆

Agriculture is a paycheck every payday for 16 million Americans. They make, ship, and sell tractors, combines, milking machines, fertilizers, fencing, building materials; generate and transmit electricity; refine petroleum or make tires; or in other ways service and supply farmers.

◆

Farm and Home Safety people say be sure to use proper signal and warning devices when driving tractors and other farm equipment on roads.

◆

Proper fertilization doesn't cost. It pays.

$1,000 Orchard Waterway Job Is Paying Off

By W. R. Fibich

BY moving about 5,000 yards of earth at a cost of $1,000 George ?heasant converted an old eroding vaterway into a usable part of his 0-acre apple orchard in the Eph- ata Soil Conservation District in entral Washington.

The Sheep Canyon drain, as it s commonly called, carries runoff vater from some 2,000 acres of dry vheat and rangeland, with a heavy ow when snowmelt and flash rains rom the watershed concentrate in he creek bottoms. This erosive ow entered the irrigated lowlands y way of a meandering stream vhich eroded more each year, and he waterway area was covered by agebrush and trash.

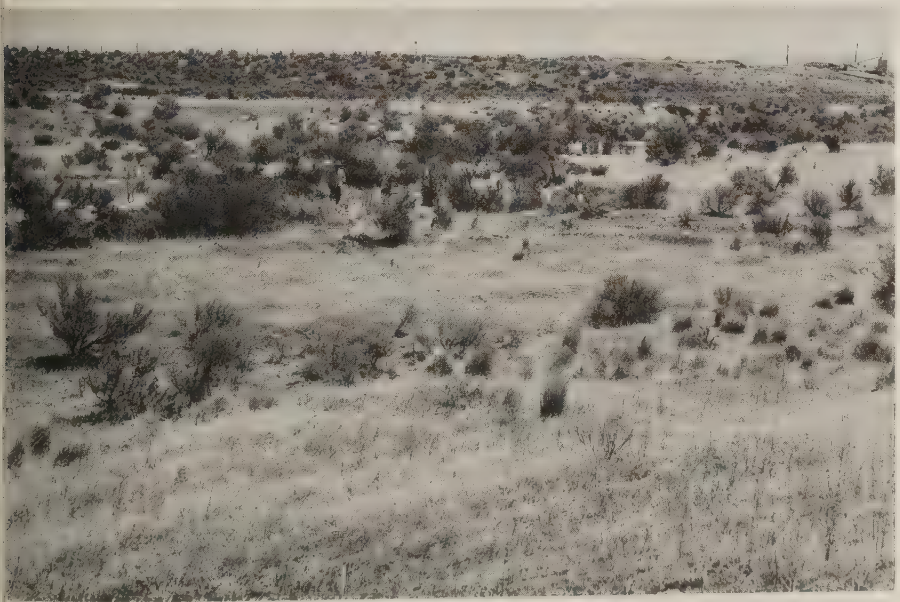
Work on rehabitating the water- vay was begun in 1956, with tech- ical help from the Soil Conserva- ion Service through the district. Ialf the cost was shared by the rant County Agricultural Conser- ation Program.

Jote:—The author is soil scientist, Soil Con- ervation Service, Ephrata, Wash.

After the drain was cut to grade, manure and zinc, plus nitrogen, phosphate, and potash fertilizers, were plowed into the soil on the sides and bottom of the waterway. Where the channel had meandered back and forth, the land was cleared of sagebrush and trash and leveled; and 100 pounds of nitrogen an acre, plus many loads of manure, were plowed in.

Pheasant's experience was that the earthmoving should be done in the early spring, in order that a sod of mixed sweetclover and orchardgrass could form in the channel bottom. After the sod was established, thistles and weeds were mowed, because any such obstructions would divert the water from the bottom of the waterway and cause erosion of the sides of the channel.

The rebuilt waterway is about 2,000 feet long and 50 feet wide, and has a grade of 2 percent. It is designed to handle peak runoff of 240 c.f.s. of water, because all caution must be taken to prevent water damage to an expensive crop like apple trees.



Waterway before shaping and seeding.

Results of Pheasant's waterway development with established apple orchard.

Stabilization of the waterway makes it possible for Pheasant to use his sprinkler irrigation equipment over the whole 20-acre field, and to operate his farm machinery across the drain, instead of having to drive around it.

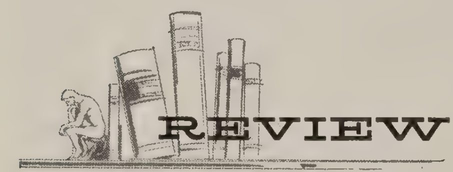
This land now is growing 2,600 4-year-old trees, which already are producing about two boxes of fruit apiece annually. He figures he has developed an orchard that will produce apples to compete on any market.

Pheasant also farms 312 acres of irrigated land, which is in corn, beans, small grain, hay, and pasture, and has 100 beef cows. He believes his new operation will pay for itself in a few years, by proper use of all land on the farm, as well as in soil and time saved.

◆

"John Lane, Senr., the inventor of the steel plow, died at his residence in Lockport, Ill., on the 5th of October, after a brief illness. Mr. Lane emigrated to Illinois in 1833, and in that year invented the steel plow, which is now in general use throughout the West."

—Scientific American, November 1857



INTRODUCTION TO SOIL MICROBIOLOGY. By Martin Alexander. 472 pp. Illus. 1961. John Wiley and Sons: New York. $9.50.

An authoritative, up-to-date text on soil microbiology is indeed welcome. In the opinion of your reviewer, this phase of soil science does not receive the attention that it should. More nearly adequate understanding of many processes of soil genesis and behavior seems to be limited by our knowledge of the role of soil organisms. Yet so many kinds of organisms exist together in real soils that quantitative research results, contrasting one kind of soil with another, are exceedingly difficult to come by.

The focus in this book is on the organisms themselves—their classification and morphology, and the biological-chemical processes they stimulate—rather than on soils. The biological-chemical processes are well handled in modern terms.

Individual chapters are devoted to bacteria, actinomycetes, fungi, algae, protozoa, viruses, microbial physiology, organic-matter decomposition, cellulose, hemicellulose, lignin, other polysaccharides, hydrocarbons and pesticides, mineralization, and immobilization of nitrogen, nitrification, and denitrification. Two chapters are on nitrogen fixation, four on mineral transformations, and two on ecological relationships.

Despite a short and cryptic introductory chapter on general soil science, very little of the discussion is related to kinds of soil. Most suggestions for application would seem, by implication, to apply to humid, temperate climates. For example, the comparisons among soils under grass, under forest, and under crops would be different on the Latosols. The papers of P. H. Nye and others on the organic matter of these soils would have been helpful. In listing the important small animals in soils, termites are not even mentioned!

The so-called nitrogen cycle needs fuller treatment. The classical diagram in textbooks fails to account for much of the nitrogen taken in by both native and crop plants. Although the author gives emphasis to the role of algae for nitrogen fixation in soils under lowland rice, nothing is said about their role in deserts. Nitrogen fixation by *Beijerinckia* in tropical soils and on the leaves of tropical plants is only mentioned.

These comments are not intended to be critical of the author but to illustrate how far we have to go. We need more study of the microbial population of our soils. Especially do we need the integration of these results with those of soil genesis, soil classification, and the other aspects of soil science to broaden our understanding, and to improve the principles of general soil science that guide our predictions of how soils respond to management.

In the meantime, a lot can be learned from this book that will help our thinking about the soils we know most about.

—CHARLES E. KELLOGG

CHEMICAL AND NATURAL CONTROL OF PESTS. By Dr. E. R. de Ong. 244 pp. Illus. 1960. Reinhold Publishing Company, Inc.: New York. $7.50.

In a relatively few pages for such a large subject, the author has written a well-balanced text. It should prove useful to professional crop specialists, instructors, manufacturers, farmers, and gardeners in evaluating control measures.

Insect and disease control methods are given for major field crops, trees, small fruits, vegetables, and ornamentals, as well as for livestock, household, and storage pests. Some information also is given on weed control.

The first few chapters deal with natural control of pests, their diseases, and the development of plant varieties resistant to insect and disease attacks. The author discusses the subject of using chemical controls to the point where beneficial insects are almost exterminated. He also discusses the development of insects that are resistant to the effects of chemicals.

—B. D. BLAKEL

NOVEMBER 1961

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

"Because the ground is chapt, for there was no rain in the earth, the plowmen were ashamed, they covered their heads. Yea, the hind also calved in the field, and forsook it, because there was no grass. And the wild asses did stand in the high places, they snuffed up the wind like dragons; their eyes did fail, because there was no grass."

—JEREMIAH, 14: 4-6

VOL. XXVII, No. 4 NOVEMBER 196

CONTENTS

COVER PICTURE—Conservation range management pays top grass dividends for Jess McGinley on his 35,000-acre ranch in the Cherry County (Nebr.) Soil and Water Conservation District, as it does for thousands of other Great Plains stockmen.

Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAM
Administrator, Soil Conservation Serv

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FRANK B. HARPER, Editor

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Great Plains Conservation Program

—*Tailored To Fit a Region*

By Donald A. Williams

LAND and people in the Great Plains are sharing the benefits of soil and water conservation planning and action locally initiated and carried out with Federal and other technical and financial help.

In no other major agricultural part of the Nation is what happens on the land more sharply reflected in the area's economy and the welfare of its residents than in this 36-million-acre region occupying the major part of 10 States from North Dakota to Texas. In World Wars I and II, it lived up to its name as the Nation's "breadbasket," and in the drought years of the 1930's it put "dust bowl" into the dictionary.

By the same token, no other part of our country was better suited to demonstrate the practicability of soil, water, and plant conservation and its beneficial effects in rural area development. Today's nationwide soil and water conservation program grew out of the Great Plains' need for conservation action in the drought years. Plains land owners and operators have demonstrated over the years since that it is economically feasible to use tillage, cropping, pasture-management, water conservation, and other measures that help to offset the damaging and costly effects of dry years.

They have done so by using various conservation "tools" made available since the mid-thirties. These have included farmers' and ranchers' soil conservation district programs, Agricultural Conservation Program cost-sharing, the Conservation Reserve Program, watershed-protection and flood-prevention projects, Farmers Home Adiministration lending, and other financing.

An unique approach to Great Plains soil and water conservation problems, and one that already is amply proving its practical effectiveness, is that being made through the Great Plains Conservation Program. It is the first time that a conservation program, suggested by responsible agricultural leaders of the area, has been tailored to fit the specific conditions and problems of a single whole region as a unit. This program also is fundamentally different in that the law authorizing it requires participating land owners or operators to have complete conservation plans for their farm or ranch units, in order to be able to receive Federal cost-share payments, under voluntary 3- to 10-year contracts.

The program's emphasis is upon sound land use, within the existing local-State-Federal framework of conservation action in the Great Plains. Through it, as more and more operators have found each year since the program's actual start in late 1957, the people of this area are able to do a still better and faster job of safeguarding their soil and water resources.

For example, at the end of the last fiscal year there were approximately 7,000 Great Plains Conservation Program contracts in effect, covering more than 18 million acres, with a backlog of about 3,000 applications. Significantly, 608,000 acres, or 28 percent of all the cropland on participants' farms or ranches, had been or will be converted to permanent vegetation since the program began, most of it under program contracts. In addition, 557,000 acres of range had been reseeded or planned. That is not to mention water conservation, cropping, windbreak planting, and other measures involved in their basic conservation plans.

Dry 1961 in parts of the northern Plains reminds us that drought and its individual and community hardships may be expected in the future. But this year's experience was different in one all-important respect: In the 1930's we were unprepared for such climatic disasters. Today, soil- and water-saving measures are proving their effectiveness in lessening the effects of dry seasons on the land, its operators, and their communities.

When enough land unsuited to cropping is back in grass as Nature intended, and has the benefit of other conservation treatment, the Great Plains region will experience an economic stability never enjoyed before in the hazardous areas. With less chance of failure, those farms and ranches planned, treated, and managed according to the proved sound principles of the Great Plains Conservation, soil conservation districts', and related programs will be better financial risks in periods of drought. We may expect drought and water shortages to become less and less formidable in the future as this conservation work progresses.

Drought-defying Conservation Farmers

REPORT

By Tarleton Jenkins

NOTHING makes soil and water conservation farmers show up better than does drought like that which has lasted up to 3 years or more in places in the northern Great Plains.

Although nobody escapes its blight, conservation farmers and ranchers have been getting along better than their nonconservation neighbors, as a sampling of their experiences in the dry areas confirms.

Take, for example, farmers in the Fall River County Soil Conservation District in South Dakota, who experienced 2 record dry years in succession in 1960 and 1961. Range grass did not grow this year; and irrigation ditches carried only a fraction of their normal flow, after a 1960 water allotment only a third of normal. The important sugar-beet crop did not mature; winter wheat had been destroyed by winter winds; and spring wheat made a poor crop generally, hail destroying some of the better stands.

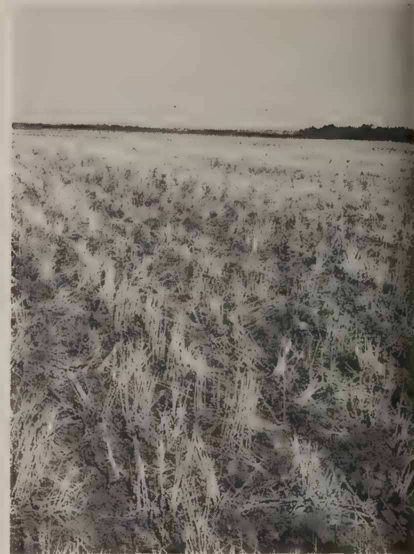
Grass comeback after brush control under GPCP on L. V. Gills ranch in Upper-Pecos (Tex.) SCD.

Richard Anderson of Burdock, in the Fall River district's driest part, reports he actually increased production on his range. He credits his conservation use of grass, along with stockwater development and fencing for more even grazing. He cut hay on a pasture which had only one irrigation.

In order to be completely safe, Anderson reduced his cow herd to only a few milk cows. He plans to restock his cattle when more nearly normal rainfall returns, meanwhile figuring his range will be all the better for the rest—an investment, not an expense.

A trademark of conservation farmers is their store of feed against dry times, Eugene Staggs in the Wibaux, Mont., Soil Conservation District is representative. He has an abundance of hay in stack and more feed in reserve in his pastures. He could have cut still more hay in his buffer strips, but he left them to protect his land against soil blowing. Staggs also put down a well where he and his neighbor, Adrian Galster, both could use it for their cattle.

Harold Tolksdorf in the Richland County Conservation District, also in Montana, said he would have had to dispose of his herd as early as the summer of dry 1959 if it had not been for his soil and water conservation work. His complete conservation plan includes a water-spreading system that has assured him a hay crop.



Stubble mulch through GPCP plan
Mrs. M. A. Bush farm in Wichit
Brazos (Tex.) SCD.

He had a good supply of hay
1961 that he had carried over fro
1960; and his pastures have
abundance of old grass—just
case.

William Knauss and Cliff Brec
heimer, near Tonla in northeaste
North Dakota, figured their 19
wheat yield at 2 to 3 bushels
acre more than that of farmers n
using conservation practic
Knauss' pastures went through t
season in good to excellent con
tion in spite of the poor rainfa
He said that in his opinion farme
without enough pasture now a
those who didn't have enough
start with.

In the same area, Arnold Ols
of Bartlett estimated that cons
vation measures meant 3 or 4 bu
els more an acre in his flax yie

In northwestern North Dakota
Lower Yellowstone Soil Conser
tion District, farmers in 1961 g
wheat yields ranging from 12
18 bushels an acre; while those
using conservation rotations wi
good soil management harvest
only 5 to 10 bushels.

Note:—The author is Field Information S
cialist, Soil Conservation Service, Denver, C

gout on R. K. Wootten ranch in Mora-San Miguel SCD, N. Mex.

A. J. Briar, who has developed omplete soil and water conserva-n plan since 1956, said his pas-es have continued to improve, in te of drought, with key grasses king seed this year. His 360 es of hayland produced 450 tons, ich he invited neighbors to cut halves.

"It was quite a help to them," iar said with understandable sat-action.

Irrigation farmers, too, have ir troubles when the water sup- is curtailed. Andrew Cayko in Lower Yellowstone district was e to irrigate 65 acres with the ter he is allowed, because of im-ovements he has made in his irrigation system, with help from his soil conservation district and the Soil Conservation Service technicians assigned to it. Otherwise, he would have been able to irrigate not more than 35 acres, and not very efficiently at that. And he has been able to reduce labor costs considerably in the process.

"I'll make a profit this year as it stands," Cayko said. "With the old system it would have been different."

In the Perkins County Soil Conservation District down in South Dakota, drought has brought no disaster to the Veal Brothers, who have been practicing soil and water conservation for years. They harvested their usual large acreage of hay this year.

"We normally don't harvest hay for sale," Ed Veal reported, "But this year we have sold to our neighbors when they ran short."

A good carryover of old grass on the Veal range is an objective each year. A reliable system of wells and stock tanks also has relieved the Veals of stockwater worry in an area where others suffered from a serious water lack.

Emil Streyle in the Dewey County Soil Conservation District near Isabel, S. Dak., harvested an average of 17 bushels of winter wheat this year, which topped the average reported by his neighbors by 5 bushels. Streyle credits his stable yields to terracing and stubble-mulch tillage, along with a grass-legume rotation.

od pasture (left) resulting from deferred grazing contrasted with poor pasture on other side of fence.

Ensilage sorghum 12-plus feet high grown by Kenneth Zimmerman in Decatur County (Kan.) SCD under his GPCP.

In the same area, Jack Leibel of Glencross, who has been a conservation farmer for 3 years, says there was a well-marked difference between the land which had the benefit of soil conservation treatment and adjoining land. His corn on a conservation-treated field outyielded that of a neighboring field by 15 bushels an acre, he said. He has applied about four-fifths of the needed soil and water conservation practices to his farm in cooperation with the Dewey County district.

These are but a random few among the uncounted numbers of farmers and ranchers who have similar drought-defying experiences to report as a result of using soil and water conservation measures through their soil conservation district and Great Plains Conservation programs.

Grass in 1960 on denuded range overseeded in 1958.

Early GPCP Contract Brings Many Benefits

By James D. Abbott

BETTER crops and grass and an end to wind erosion are among the benefits being reaped by H. E. Schuster and son Jack on their Texas farm from one of the first Great Plains Conservation Program contracts in the Nation to be signed and completed.

Actually, their 3-year contract, signed on December 20, 1957, was No. 4, preceded by one in North Dakota and two others in Texas the day before. The contract for the Schuster farm, near Muleshoe in Bailey County, was completed December 31, 1960.

The elder Schuster started his soil and water conservation program in 1950, when he became a cooperator with the Blackwater Valley Soil Conservation District. Because of the financial outlay needed to build structures and apply some of the other practices called for in his district plan, he figured the Great Plains cost-sharing program was made to order fo enabling them to speed up thei conservation work. The result have proved he was right.

In completing their contract the Schusters revegetated 27 acres of their cropland to nativ grasses, established 5 conservation irrigation systems requiring 1.5 miles of underground high pres sure pipeline, built 8.9 miles o terraces and 1.2 miles of diversions practiced proper use on 361 acre of rangeland, and used all th practices necessary to make thei conservation cropping system worl properly.

With the completed conservatio program in operation, Schuster de cided to retire and turn the farm over to Jack and his son-in-law Jim Green. Schuster takes satis faction in the fact that he turne the land over to them in muc better shape than when he bega to farm it, and is counting on them

Schuster (center) and SCS technicians study native range to be revegetated under his GPCP.

Wheat stubble mulch on Schuster farm.

Schuster examining blue grama seed stand on land permanently retire from cultivation.

Note:—The author is area conservationist, Soil Conservation Service, Lubbock, Tex.

to continue making improvements as new conservation methods are developed.

The Schusters' cropping system has stopped wind erosion almost completely. Cotton following rye and vetch yields much better, because of improved soil condition and fertility. Their cotton makes between $1\frac{1}{2}$ and 2 bales an acre, depending on growing conditions, or more than twice the county average on the same type land. Tomatoes that followed fertilized rye produced approximately 14 tons to the acre.

Grain sorghum, planted in 20-inch rows, yielded 5,200 pounds an acre in 1958, 5,800 pounds in 1959, and 6,000 pounds in 1960. It not only produced more feed but provided more effective wind-erosion protection and did a better job in improving soil tilth. The Schusters also have used a complete fertilizer program with their conservation cropping system.

The Schusters found that their sprinkler systems have made it possible to get an even crop over all the land, and have made their irrigation water go a great deal further than before they had their conservation program.

They also now have excellent grass on their native range and pasture land. "Some of it so thick you can't see the ground," as Schuster Senior says. In spite of some failures in establishing grass on depleted and eroded lands, the Schusters kept trying until they got the desired stands.

"If I were to buy another place now," H. E. Schuster said, "I would like to use the program on it to give the complete treatment needed. Something has to happen to you before you become a real believer in soil and water conservation."

Conservation Takes Gamble Out of Wyoming Ranch Operation

By Albert P. Thatcher and Brent J. Harrison

Wyoming rancher John H. Simpson uses conservation management to take the gamble out of his 11,000-acre ranch operation in the Intermountain Soil and Water Conservation District.

"I feel that grass management should be placed on an equal basis with livestock management," he said. "I just watch the grass, and when it is used to about 50 percent, the livestock is moved."

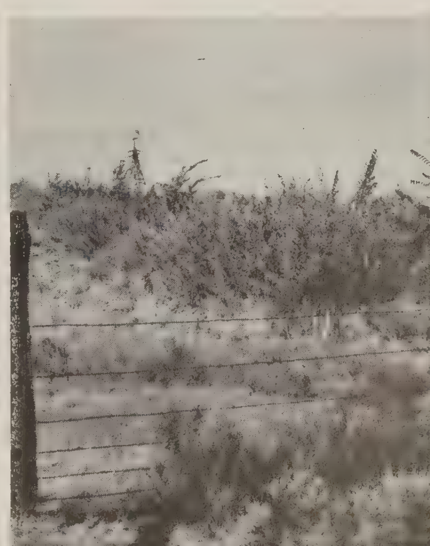
Simpson's native pasture early in the spring of 1961 had plenty of grass remaining after dry 1960. Simpson also gives his pasture a chance to rest during the growing season once every few years.

"Many people get the idea that I'm a poor livestock manager," Jack said, "because I let my cows live on grass and don't keep them up near the house for calving and wintering. I've found that when there is plenty of grass on the range, the only time the livestock need hay is when it is covered with snow. My winter feed costs are low, and also the labor costs.

"I calve my 2-year old heifers without much trouble, because they have plenty of grazing throughout the year. They aren't short of grass for part of the year and then fed extra prior to calving. In this way they can grow uniformly the year around."

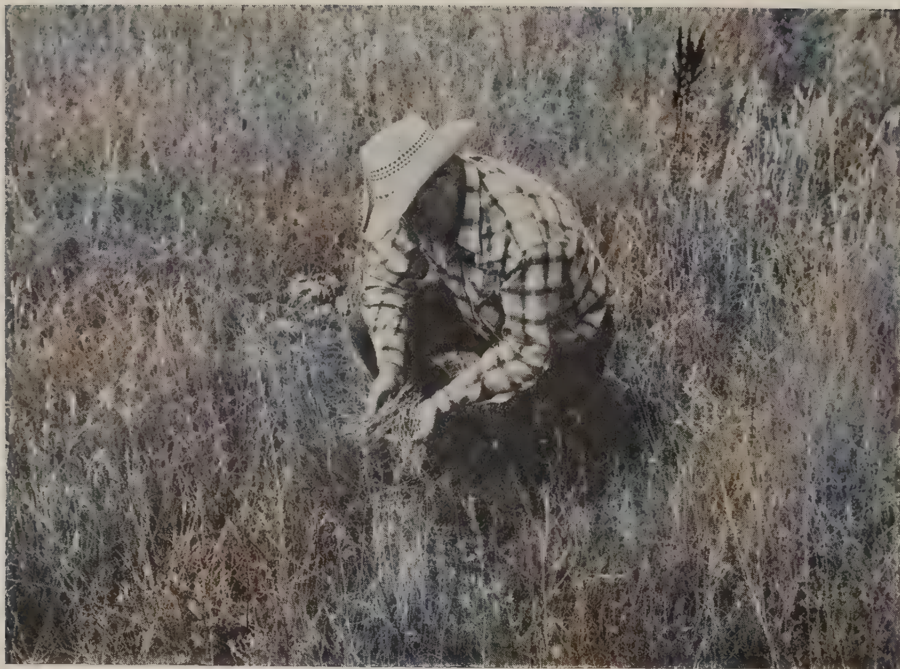
Jack studied to be an engineer in college in Colorado; but he always loved the land, and when he came back to Wyoming for a summer vacation in 1932, he stayed, starting in the ranching business by homesteading. He took over management of a large ranch in 1937, and in 1951 took advantage of an opportunity to buy a ranch of his own.

He was faced with two choices—stock heavily and gamble with the climate by trying to pay off the debt in a short period, or stock lightly and pay it off more surely over a longer time. Because of his previous experience, and having seen what happened to both the grass and the livestock when there



3-year-old windbreak surrounds one watering place.

Note:—The authors are range conservationists, Soil Conservation Service, Casper and Gillette, Wyo., respectively.



Simpson checks grass growth in 1961 on one of the small meadows developed by building water spreaders.

was a shortage of forage on the range, he decided to stock at a light enough rate to allow for range improvement and still provide sufficient forage, even in times of drought.

"While I didn't make a killing in any one year," he recalled, "my net income and growth has been steady; my grass has improved; my son is going to inherit a productive ranch; and I have fulfilled my duty in taking care of the land."

Simpson's steers have averaged about 680 pounds and his lambs about 90 pounds at market.

Simpson always has hay in reserve—3-year-old stack in foreground, with bales of 1961 crop and left-over 1960 crop in background.

Simpson entered into a contract under the Great Plains Conservation Program in the spring of 1959, in order to speed up his conservation work. Previously, much of his cropland was block-farmed and subject to wind and water erosion. Through this program, he has planned or installed more than 15 miles of terraces, 300 acres of wind stripcropping, 180 acres of contour stripcropping, and a grassed waterway. He harvested 16 bushels of wheat an acre in 1961, while his

One of 3 wells being drilled for water in outlying pasture.

neighbors were cutting theirs for hay or turning stock onto it. His 8-year average has been 20 bushels.

He also has seeded more than 150 acres of his least productive cropland to crested and intermediate wheatgrass, which now is being cut for hay and pastured, and small areas of poor cropland within native pastures back to native grasses. He likewise has installed many small erosion-control dams to heal gullies, and check dams to hold back water to produce hay. He has built cross fences to enable him to practice deferred grazing. Of last year, which was exceptionally dry, he said:

"I didn't get through putting up hay; I just quit."

The job is not finished. This 1961 scene shows soil blowing from an unprotected field in a northern Plains drought area.

A Program for the Plains

By Cyril Luker

THE Great Plains Conservation Program may set a pattern for dealing with soil and water conservation problems on a coordinated regional basis.

This program, already proving its effectiveness in the 10 Plains States, supplants no other conservation undertaking and requires no separate agency to administer it; yet it has stimulated, through its voluntary cost-sharing mechanism, a speeded-up drive by Plains farmers and ranchers to take hazardous lands out of cultivation and to apply complete soil, water, and plant conservation systems on the rest of their holdings and thereby assure the stability of their operations.

The Great Plains Conservation Program is a long-term soil and water conservation program authorized by Public Law 1021 in August 1956. It is designed to meet the needs of the Plains part of an area consisting of 422 counties extending from the Rio Grande in Texas to the Canadian border of North Dakota and Montana. In these 422 counties live 335,000 farmers and ranchers, who normally produce 60 percent of the Nation's wheat and 37 percent of its beef. The hazards of climate, variable soils, and economic conditions have, in combination, often made agricultural production uncertain in this vast area.

The Great Plains Agricultural Council recommended this program as a means of providing a greater degree of agricultural stability in this highly productive area. The program is tailored to fit the particular needs of this region and those of individual operating units. It provides assistance to farmers and ranchers for carrying out plans that include sound cropping and grazing systems, land-use changes, and the application of enduring soil and water conservation practices.

The Great Plains Conservation Program is an intensification of the conservation work that land owners and operators have been doing through their soil conservation districts. Soil conservation district leadership has played a prominent part in developing and carrying out this program from its beginning. A distinguishing feature of the Great Plains Conservation Program is that it enables soil conservation districts to speed up the application of conservation work that otherwise would move much slower.

It brings together into one plan all conservation program assistance of the Department of Agriculture and the States for doing the complete job. Farmers and ranchers may select cost-sharing practices in different programs, including P.L.

Note:—The author is assistant to the Administrator, in charge of the Great Plains Conservation Program, Soil Conservation Service, Washington, D. C.

This pasture near Dalhart, Tex., looked like this in 1937 as a result of past heavy grazing and wind-erosion damage.

Here is how it looked in 1961, after several years' cultivation before being reseeded to grass.

Former cropland on P. E. Starr farm in Salt Fork (Tex.) SCD reseeded to native grasses, with well for water.

1021, that best meet their needs. They add the annual recurring practices that round out the basic requirements of a complete plan.

Along with the land-treatment practices, the farmer or rancher also selects land that surveys indicate is substandard for cultivation and schedules it for planting to grass. Needed land-use change was the leading point of consideration in the passage of the Great Plains Conservation Program legislation. About one-third of the cropland in plans written to date has been contracted for conversion to permanent grass

In addition to the coordinated effort of the Department of Agriculture on physical conservation problems through the program, a better base is provided for other types of assistance such as conservation loans, crop insurance, and educational and research programs.

A fundamental aspect of conservation is that of making certain that planned conservation work is applied to the land in the shortest practicable time. Cost-sharing for practice installation assists greatly in speeding up this program. Cost-sharing under P.L. 1021 is designed primarily to help farmers and ranchers do those things they are unable to do without such financial aid. Cost-sharing is provided for permanent, nonrecurring practices, and all annual, regular farming-type practices are installed at the producer's own expense.

Cost-sharing to carry out the combinations of practices the farmer sets up in his basic plan is obligated at the time the plan is made. This arrangement insures the availability of funds to carry out the practices as rapidly as practicable.

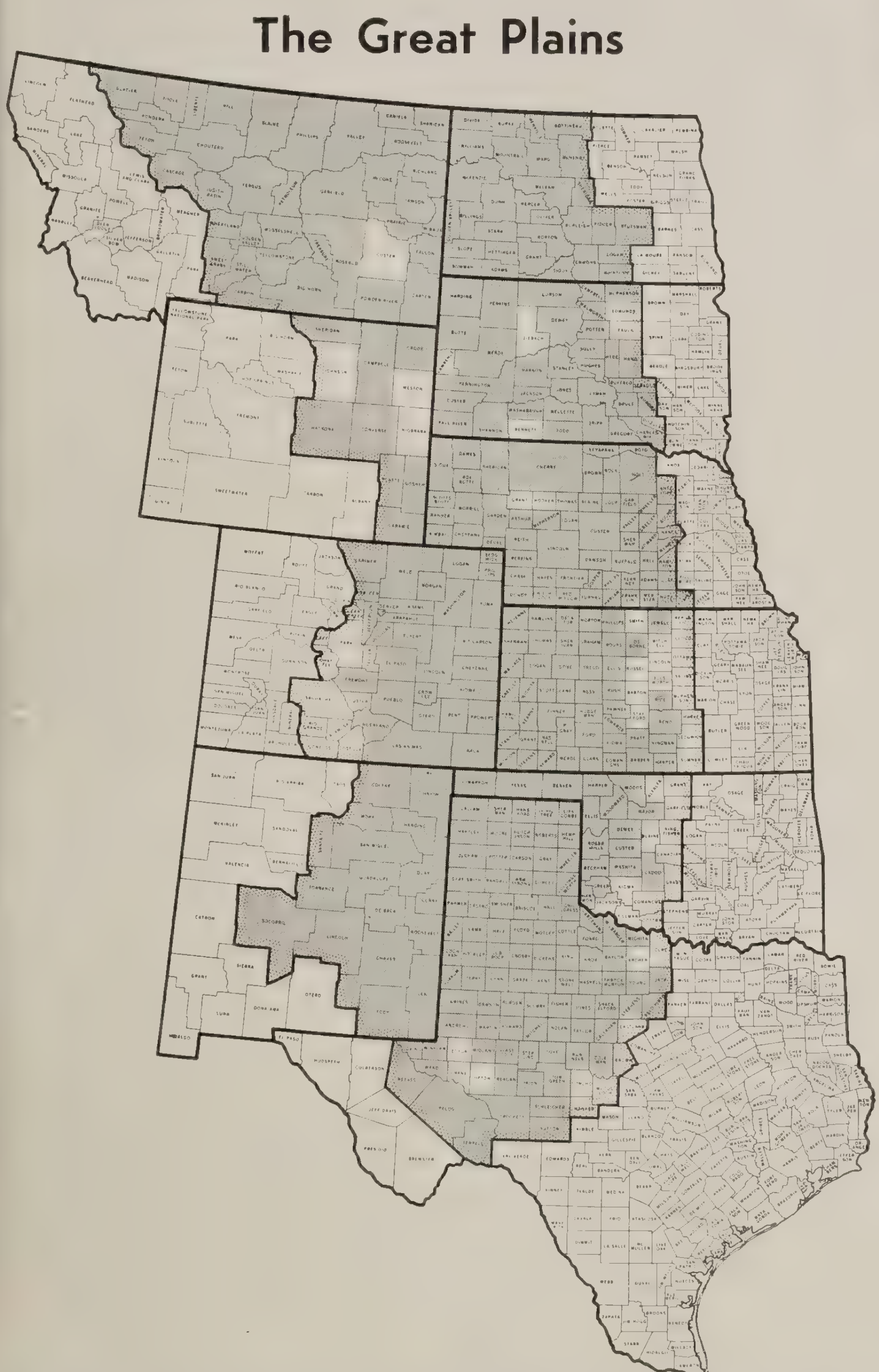
Of $50 million appropriated up to this time, about $35 million has been spent or obligated. The law authorized no more than $150 million over a 15-year period beginning in 1956 for cost-share pur-

Johnsongrass grown on land with water-spreading system on Jack W. Stone ranch in Toyah-Limpia (Tex.) SCD.

poses. No more than $25 million can be spent for cost shares in any one program year. The program comes to an end December 31, 1971.

The principles of this program call for use of all the land on the farm within its capability. In most cases, substandard cropland is shifted to grass, and allotted acreage of basic crops is shifted to the remaining cropland.

Progress of conservation work through the Great Plains Conservation Program since the first contracts were signed in December 1957 has been as rapid as available funds and technical assistance would permit.



Map of 10 Great Plains States showing boundary of 422 eligible counties and (shaded area) 361 counties designated to June 30, 1961, for participation.

Assistant Secretary Frank J. Welch.

It Can Be Done

"Landowners and operators can control the conditions that turn drought into calamity," Assistant Secretary of Agriculture Frank J. Welch said in a statement to the 1961 meeting of the Great Plains Agricultural Council. "They can do so by treating and using their lands in such a way as to give them maximum protection against moisture failure and the ravages of wind and insects.

"Great Plains farmers and ranchers have made great progress in utilizing soil and moisture conservation, financing, and the other aids that first began to be made available to them in the thirties.

"A tremendous amount of work remains . . . Many thousands of farms still need the benefit of long-range land-use adjustments.

"This is no overnight undertaking, we know, and all of us must do everything we can to speed up this vital work. That includes your Great Plains Agricultural Council through its advisory guidance; the U. S. Department of Agriculture through its technical, financial, research, and educational facilities; State and local agricultural agencies, from the experiment stations and land grant colleges to soil conservation districts; and, most importantly, all landowners and operators."

The Changing

Native buffalo did not have to worry about having enough to eat—there was grass in abundance almost everywhere.

U. S. Geologist F. V. Hayden reported finding his 1870 expedition camps like this one in present Uinta County, Wyo., "very pleasant, with abundant grass for our animals." This picture by W. H. Jackson also shows the clear water of Black's Fork.

This is what men and their plows did to great acreages of Plains land over the years, particularly during the World War I and II periods.

Great Plains

Neither did the longhorn cattle which the first stockmen ran on the still bountiful range where the buffalo had roamed.

Less than 70 years later, the stream was half filled with sediment, and the grass had been replaced almost entirely by brushy vegetation—all within the life span of those who had used, or misused, the land during the intervening years.

Today, millions of acres of once-cultivated land and depleted range are being restored to the grassland abundance of yesterday through conservation seeding and management.

Grass + Water = Beef x Pounds

By Charles Reagin

TO a rancher like Bob Shoemaker of Colorado soil and water conservation can turn up a lot of side benefits.

For example, there's riding time. Shoemaker says he can check his herd in about half the time it used to take, because of better spacing of his water developments, with his herd feeding more of the time instead of traveling from one end of the range to the other for water.

And there's the important item of better condition of the cows at calving, as a result of his having cut the size of his herd and having better grass and more hay and silage for the remaining animals.

But the major benefit is enough feed for the winter. When you buy hay at winter prices, you get this part of the picture fast, because lack of feed can cut into operating cash reserves even faster.

Right after Shoemaker took over management of the Chess-Shoemaker outfit near Canon City, in the Fremont Soil Conservation District in 1955, he started applying a few basic conservation rules with the help of the Soil Conservation Service. One had to do with grass. Shoemaker wanted better grass, and he knew the way to get it lay in easing up on its use, even though that meant cutting the breeding herd from 300 to 200 head.

Shoemaker figures the herd reduction to be a temporary move. With improvement of his range, he eventually will be able to add to the herd, because there will be more grass of better quality. Meanwhile, another factor to be considered is that there's less expense attached to a smaller herd.

Average weight of spring calves, when marketed in the fall, has increased from around 375 to 415 pounds, a 40-pound improvement which Shoemaker attributes mainly to their better range.

Irene Chess and Shoemaker decided in 1959 that their partnership would benefit by entering the Great Plains Conservation Program. It offered a way to get complete conservation on the ranch faster with Federal cost-sharing help, and a complete soil and water conservation system was what they meant to have.

Shoemaker had been building erosion-control dams, with the Agricultural Stabilization and Conservation Program helping in financing this part of his program. The added stockwater, which made unused grass available to their cows, did something else. It raised the water table, and springs long dry started to flow again.

When Shoemaker leveled 37 acres of irrigated land and improved the ditch system, it helped him to get better results with less water. There has been his gully-control work, too, and grass already is growing on the scarred earth.

Shoemaker grows corn for ensilage and follows it with oats and alfalfa. The rancher says he will get 15 to 20 tons of ensilage an acre. At $7 a ton, such a return is hard to beat.

A mountain of hay for Shoemaker's cattle this winter.

Note:—The author is work unit conservationist, Soil Conservation Service, Canon City, Colo.

Young Wayne Shoemaker studies blue grama grass with Author Reagin.

As a result of using the soil conservation district and Great Plains Conservation programs, the Chess-Shoemaker partnership is able to report that the grass is improving; they are selling as many pounds of beef as before, at less cost to produce it, despite cutting their breeding herd by one-third; they no longer have to buy winter feed; and, for the first time in their experience, there was grass left on the winter range at the season's end.

The Chess-Shoemaker ranching business is operating in the black, with built-in drought insurance, so it can withstand any dry year—and almost any string of years—that Plains history teaches may come along.

◆

To check the depth irrigation water soaks in their soil, some irrigators use an inexpensive soil probe made from an unpointed ½-inch steel rod, 4 feet long, with a crosspiece for a handle welded on the top. Such a probe can be made easily in a farm shop, Donald J. Brosz, Kansas State University, points out.

TAME PASTURE WORKS For Father-Son Team

By Donavon E. Broberg and Gene L. Williams

FATHER and son Joe and Curtis Feist of Velva in North Dakota have at least two good reasons for being boosters of tame-grass pastures as a supplement to their native rangelands—better milk production and stronger and faster-growing calves.

With tame-grass pastures, the Feists have found during several years' experience that they can turn out their cattle on the grass earlier in the spring, handle more cattle on fewer acres, and feel more assured of pasture by using both tame and native grasses.

The Feists operate a 1,325-acre livestock farm in the South McHenry Soil Conservation District, including about 860 acres of native grass and 70 to 100 acres in tame-grass pastures. Crested wheatgrass and bromegrass are the principal tame grasses.

The cattle are turned out in the spring onto a crested wheatgrass pasture when the grass is about 5 inches high; because it is the first grass to green up and is palatable and nutritious. By the time the crested wheatgrass starts becoming stemmy and unpalatable, the bromegrass is ready to pasture; and, after mid-June, another pasture of bromegrass and alfalfa feeds the cattle until the native pastures with their warm-season grasses are ready. This system of management allows each of the grasses to be used when it is the most palatable and productive.

Note:—The authors are, respectively, agronomist, Bismarck, N. Dak., and work unit conservationist, Velva, N. Dak., both of the Soil Conservation Service.

In order to keep their tame-grass pastures in top production, the Feists fertilize regularly with nitrogen, and mow the weeds and stemmy plants to encourage even grazing. Grazing is managed to allow the grass to develop root reserves before winter. Tame-grass pastures also make it easier to maintain the native pastures in top condition.

Feist's tame grass pasture for spring grazing.

Feist, a cooperator with the South McHenry district since 1953, now is participating in the Great Plains Conservation Program. With the help of its cost-sharing, he has built an irrigation dam and spillway, and plans to use the irrigation water for tame pasture, hayland, and forage crops.

◆

The North Dakota State University says a new grass, Vinall Russian wild rye, could become one of the important grasses in the State. Not only is it as early as or earlier than crested wheatgrass, but it makes good hay and fall pasture.

From Brush to Grass

By Homer A. Taff

BRUSH control on rangelands is one of the conservation practices that is paying off in the Great Plains Conservation Program.

One of the main problems in Texas agriculture is the encroachment of brush—mesquite, juniper, and shinnery oak—onto millions of acres of range. Surveys have showed 55 million acres of mesquite infestation alone. This drought-defying plant spreads rapidly with the dropping of seeds by cattle and other animals.

Getting damaged and low-grade cropland into useful grass cover is a primary objective of the Great Plains Conservation Program. Work done with help from the Agricultural Conservation Program and the Conservation Reserve Program has given further impetus to this undertaking.

Reseeding drought-damaged range is another tailor-made practice, and development of dependable water for livestock is another. A third is the opportunity to make irrigation systems more efficient.

J. Frank Bennett, rancher in the Cochran Soil Conservation District, reports his range output has more than doubled since he controlled shin oak brush and reseeded 5,606 acres to adapted native species. J. L. Stuart, in the Lipscomb Soil Conservation District, had a similar observation:

"The pastures where I sprayed the brush and deferred grazing have the best grass I have ever seen on them."

He is putting 584 acres of low-grade cropland into grass, among the practices called for in his complete Great Plains Conservation Program.

Grady Halbert of Foard City, chairman of the Lower Pease Soil Conservation District, who has almost completed work on two Great

This 6-foot mesquite tree on Vaugh Hall ranch in Floyd County (Tex.) SCD sapped moisture with 25-foot root before removal under GPCP.

Formerly eroded field on Rhode and Gould farm in Donley County (Tex.) SCD is protected and productive after being seeded to native grass.

Note:—The author is assistant State conservationist, Soil Conservation Service, Temple, Tex.

C. V. Hewitt pasture after rootplowing and reseeding in Howard (Tex.) SCD.

Plains contracts, said, "many farmers in our district would not have been able to make the conservation changes they needed without the kind of help the Great Plains Conservation Program gave them."

Banker O. R. Stark, Jr., of Quitaque, in the Cap Rock Soil Conservation District, took a close look at the Great Plains Conservation Program when it was announced, and became an active supporter of the program, as did many of his customers. He influenced many of them to make use of the program's help in seeking needed land treatment done on the Kent Creek watershed project.

From shin oak to sea of grass in 2 years on J. Frank Bennett ranch in Cochran County (Tex.) SCD.

Timing Is Key To Irrigated-Pasture Management

By Dan L. Herman

CAREFUL timing of their conservation-management operations on irrigated pasture that formerly was cropland is credited by Wyoming livestock growers Lawrence Corbett and Sons of Worland with their success in getting top beef production.

"To get the maximum return from irrigated pasture," Corbett Senior says, "it must be maintained in a lush condition at all times, and proper management is the most important step."

Corbett is a supervisor of the Washakie Soil and Water Conservation District.

Good pasture brings Corbett maximum returns—protects his land.

In developing his conservation plan, he converted 34 acres of cropland to irrigated pasture. The soils map made by Soil Conservation Service technicians showed that the slope on part of this acreage to be 8 percent. By converting to a grass cover, the erosion problem he had been contending with was solved.

Each operation is timed so it fits into the overall plan for proper management of the Corbett pastures. The excellent pastures that have resulted and the increased returns in beef show how this management plan pays.

A rotation cycle of 21-28 days is used. The pastures are fertilized three times—about the first of March, July, and September. They are clipped twice during the season, droppings are scattered three times, and the pastures are irrigated twice during each rest period.

The Corbetts have a cow-calf operation. Grazing begins about May 1, and the stock is on the pastures until October 10. Beef production averages 706 pounds an acre.

"Returns per acre from my irrigated pastures are greater than my

Note:—The author is work unit conservationist, Soil Conservation Service, Worland, Wyo.

returns per acre from beans or small grain crops,'' Corbetts says. ''They must be given the same management and consideration as those of any cash crop. By timing the management on my pastures, they are always in lush condition, giving maximum returns.''

The good returns from their conservation-managed irrigated pastures prompted Corbett and Sons to expand their cow-calf operations for 1961, to harvest the grass from an additional 25 acres of pasture seeded last year.

Conserving Runoff Water With the Zingg Conservation Bench Terrace

By Victor L. Hauser

DATA resulting from research evaluation of the Zingg conservation bench terrace at the Southwestern Great Plains Field Station indicate that this slope-control practice will conserve runoff water effectively on dry lands of the southern Plains.

The Zingg terrace system being studied at the Bushland, Tex., station comprises level contour benches and ridges to provide soil erosion control and to retain, spread, and infiltrate surface runoff for improvement of soil moisture and related crop production.

A level contour bench is constructed to serve as a catchment area for surface runoff from both the bench and the contributing area. The terrace ridge serves as the control for impounding and spreading runoff water. Dimensions of the system vary according to slope, soil, land use, and anticipated runoff.

The elements of the system are not new, but their combination and orientation in an attempt to develop a desirable slope-control practice are unique. Level terraces with both open and closed ends have served extensively in dryland regions. Such terraces usually impound surface runoff in a relatively narrow channel, but the runoff water is not distributed uniformly enough or over a great enough area to obtain maximum benefit of the water for crop production.

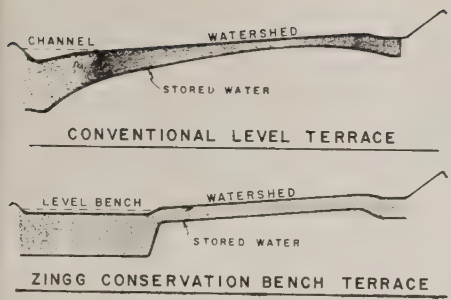
Four benches, 1,100 to 1,500 feet long and 80 to 145 feet wide, were built in the spring of 1955. Each bench is of uniform width throughout its length, to avoid point rows on the bench. A constant ratio of 2 acres of watershed for each acre in the bench was maintained for all benches. Maximum depth of cut and fill was about 1 foot.

Tops of the terrace ridges used to retain runoff on the benches were built 1 foot above the level of the bench. The ridges, which have a slope of about 1:5, were stabilized with permanent vegetation, and the ends of each bench were blocked to hold 6 inches of water on the bench. The system reduces erosion and runoff in the same way that level terraces do, and results in a larger field area being wetted by the runoff water.

Because grain sorghum grows during the summer when runoff may be expected, it is grown continuously on the bench area. The level terraces and the bench water-

Note:—The author is agricultural engineer, Agricultural Research Service, Bushland, Tex.

Water impounded on Zingg conservation benches and on level terraced land.



sheds are cropped in a flexible wheat-grain, sorghum-fallow sequence. Wheat and grain sorghum are planted during their normal planting periods, allowing either 10 or 11 months of fallow before planting each crop, unless the sequence must be broken to maintain wind-erosion control.

Heavy rains during June 1960 provided opportunity for a comparison between conservation benches and level terraces. Rainfall was below average during April (70 percent of average) and May (34 percent of average). The total rainfall for the week of June 5 through 11 was 6.20 inches—2.6 times the average rainfall for the entire month of June. Runoff water impounded on the benches was spread over a wide area in a thin sheet; whereas that impounded above the level terraces was confined to the terrace channel.

One level-terraced field was planted to grain sorghum on June 22, but heavy rains early in July drowned sorghum seedlings in the terrace channels. These heavy rains did not drown sorghum seedlings on benches planted on June 28.

Yields computed for a 100-acre field with a conventional level terrace system and for a field with a Zingg conservation bench system are shown in the tabulation. They were computed from the 4-year average grain production.

Wheat production is lower in the Zingg system because the benches are always in sorghum, and there is less land producing wheat.

The data show that the runoff water impounded on the benches was used more efficiently than runoff water held above the level terraces, and that the benches increased total grain production to about 1.5 times the production from level terraces.

No. 66

This is the sixty-sixth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

Average annual production on 100 acres

Treatment	*Wheat* *Pounds*	*Grain sorphum* *Pounds*	*Total* *Pounds*
Zingg conservation bench terrace	20,400	128,400	148,800
Level terrace	30,900	70,900	101,800

Observations of the Zingg conservation bench terraces over the 1957-60 period indicate the need for precision in leveling the benches. Minor land leveling and some land planing were necessary after 2 years, because excess water drowned areas of the benches which had not been leveled properly.

The Zingg conservation bench terrace is still in the testing stage. Additional studies are under way in other areas of the Plains. More years of results will be needed to determine the production benefits of this measure, compared to others, from the longtime standpoint. Additional information will also be obtained on methods of maintaining the level surface of the bench under normal farming operations.

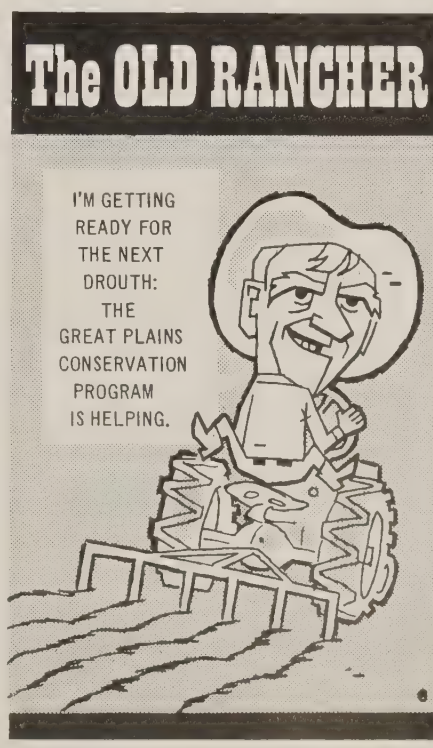
Results to date indicate that the conservation bench terrace may add another conservation tool to the list from which the farmer or rancher makes his selection to fit the needs of his land.

◆

A tillage system for planting corn in cornstalk residues has been developed at the University of Nebraska. As reported by Engineer T. D. Wittmus, it consists of cutting stalks, planting, cultivating, and ridging for planting. A machine has been developed for the planting without any other tillage, and without loss in yields. The experiments showed only .96 of an hour of labor needed for till-planting an acre, as compared to 2.39 hours for conventional tillage, and a cost of only $6 an acre compared to $13.50, with 4-row equipment.

◆

Weed control is even more important in dry years than in wet years, to conserve moisture for crops.



Irrigator Stays With His Farm
But Throws Shovel Away

By O. Wendell Thacker

When Howard Blodgett started farming more than 15 years ago near Sidney, Mont., his irrigation water had to be led around with a shovel. Even if he didn't put the shovel down until he turned the water off again, part of the field got too much and part of it not enough.

In spite of this extra work and inconvenience, there still was a pretty good living on the 262-acre farm, 152 acres of which was irrigated cropland. He was younger then, and labor was available most of the time at a price he could afford. But by 1958 things were different. The cost-price squeeze had wrung out his margin of profit.

"I felt I had reached the end of my rope," he recalls.

He thought of giving up farming to take a job in town, but he wanted to bring up his young sons on the farm.

Upon the advice of the local Farmers Home Administration supervisor, he arranged through the Richland County Soil Conservation District for Soil Conservation Service technicians to make a topographic survey and help him draw up a basic conservation plan based on a map of the soils on his farm. Water management and modification of his cropping system were the major features of his plan. It involved reorganizing his irrigation system, installing turnouts, land leveling, changing the crop rotations, establishing irrigated pastures, developing improved methods of applying irrigation water, and diversification.

Blodgett leveled 50 acres in 1959 and 1960. He estimates he is already saving more than 40 man-days of irrigating time each season. A 35-acre field he had in sugar beets in 1960 took 2½ to 3 days for each irrigation. Formerly, it required 6 to 10 days and wasn't properly irrigated then. Yields are up about 5 tons an acre.

Blodgett no longer carries a shovel while the water is running. Instead, he sets his siphon tubes and goes about his farming until it's time to move them. Beets require closer attention than corn; so he irrigates beets by day and corn by night, when the "pressure is on." He can handle larger streams of water with better water efficiency and less erosion hazards as a result of his reorganized irrigation system and improved water management. Also, he figures he won't need any seasonal help.

Sugar beets, beans, grain, and hay had been the staple crops in Blodgett's former crop rotations. His conservation plan calls for dropping the beans, raising corn for silage, and planting 20 to 30 acres to irrigated pasture. He hopes to make cattle feeding a part of his operation, as many others in the lower Yellowstone Valley are doing, and thus use his winter time to better advantage and provide manure for his fertility program.

The increased acreage of hay and irrigated pasture will stabilize sugar-beet production through better disease control and increased fertility. It also will contribute further to better beet yields, by decreasing the peak summer-labor requirements, and allowing timely completion of irrigation and other farming operations.

His water is supplied by the Sidney Water Users Association. Blodgett also used FHA financing and ACP cost-sharing.

Blodgett, with 2 sons, irrigating leveled land with recently installed siphon tubes.

Note:—The author is agronomist, Soil Conservation Service, Lewistown, Mont.

Judge Beauchamp with dairy cattle in Coastal bermudagrass pasture formerly in thick oak timber.

Retired Judge Turns Conservation Farmer

By Clifford J. Novosad and Marshall H. Nichols

MOST men take up some hobby like fishing or golfing when they retire. But not Judge Tom L. Beauchamp of the Texas Court of Criminal Appeals. He turned to livestock farming—the conservation way.

When that time arrived for 70-year-old Judge Beauchamp in June 1953, he bought 310 acres along the Red River in the North Texas Soil Conservation District. By August he had asked the district supervisors for help in working out a basic conservation plan for his Lamar County farm.

The place provided the Judge a readymade opportunity to practice his firm philosophy of man's duty to the land. The farm had many problems. Brush was a problem on 207 acres. The existing pastures were severely overgrazed and had very poor stands of a base grass. There was no adequate supply of livestock water. The best soils were too wet for growing cash crops. But to Judge Beauchamp these problems were a challenge and an opportunity.

When asked why he went into farming, he said: "Most men take up fishing, golfing, or hunting after retirement; but the fish wouldn't bite for me, the deer ran from me, and I wasn't old enough to play golf. Farming was also good for my health, as well as an opportunity to practice conservation and land improvement."

With the help of Soil Conservation Service technicians, Judge Beauchamp planned brush clearing, improvement of the existing pastures, and establishment of a base grass where brush was to be cleared and on old cropland fields. He also planned two more farm ponds for livestock water.

In 1961 his accomplishments in conservation land improvement can be seen to be paying off. He has cleared the brush and trees and planted Coastal bermudagrass on the 207 acres. He has renovated the old Common bermudagrass pastures by overseeding with legumes and putting on fertilizer. He fertilized his pastures according to soil analyses and has brought them into a high state of production. He practices good pasture use by leaving a top growth of at least 4 inches on Common bermudagrass and 6 inches on Coastal bermudagrass throughout the year.

Judge Beauchamp bought another farm, of 252 acres, in 1959 and developed a conservation plan for it, too. He has made good progress on the practices planned for the second place.

"I want to leave my land in the best state of improvement possible for the next owner or operator," is the way he sums up his conservation philosophy.

"A man has a duty, an obligation, and a responsibility to improve the land he owns. I would not have land if I couldn't improve it."

Note:—The authors are, respectively, agronomist, Denton, Tex., and work unit conservationist, Paris, Tex., both of the Soil Conservation Service.

Judge Tom L. Beauchamp's dairy cattle grazing 3-year-old Coastal bermudagrass pasture.

Feed 'Em and Reap

By W. N. Parmeter

MARVIN Wilkensen's favorite slogan is "feed 'em and reap" when he is discussing his lamb feeding operations. Wilkensen operates a 200-acre farm on the Angostura Irrigation Project, and is a cooperator with the Fall River County Soil Conservation District in South Dakota.

In 1959, he produced 454 pounds of lambs and 70 pounds of mutton an acre on 28 acres of irrigated pasture. To obtain this excellent return, he has subdivided the 28 acres into 5 pastures so that he can rotate the lambs from one pasture to another every 6 days and give each pasture 24 days' rest between grazing periods.

After a pasture has been grazed, it is clipped, if necessary, to keep the plants succulent. Four inches of irrigation water applied soon after a pasture has been grazed provides moisture for the next grazing period. The pastures are fertilized with 80 pounds of actual nitrogen and 40 pounds of phosphorus per acre, when needed.

Note:—The author is agronomist, Soil Conservation Service, Huron, S. Dak.

The lambs are fed out in the fall on shelled corn and alfalfa hay. After the sugar-beet harvest, beet tops are fed, also. Additional lambs are bought and fed according to feed available on the farm.

Four of the 5 pastures were seeded to 2 pounds of alfalfa and 8 pounds of smooth bromegrass per acre. The fifth pasture, used for lambing out, was seeded to 6 pounds of intermediate wheatgrass. Wilkensen likes to establish his pastures between the 1st and 15th of September, by irrigating small grain stubble after harvest and then seeding the grass in the stubble without any seedbed preparation.

Wilkensen is a graduate of the University of Nebraska, with a major in soils. He taught vocational agriculture for 4 years, and spent 5 years as a soil scientist for the Soil Conservation Service and one year with the Bureau of Reclamation as a land classifier before he started farming.

Marvin Wilkensen in one of his sugar beet fields.

The Angostura Irrigation Project lands were purchased by the Government through the Case-Wheeler Act in the 1930's. They were developed for irrigation before they were put in the hands of veterans through a drawing of numbers for choice of farms to purchase. Most of the farms had little or no improvements. At the first drawing in the spring of 1953, Wilkensen drew the 17th place out of 26. However, he was fortunate in getting his second choice in the farms he asked for.

Last year, Wilkensen's irrigated crops consisted of 15 acres of wheat, 37 acres of sugar beets, 23 acres of alfalfa hay, 13 acres of corn, 7 acres of oats, and 28 acres of pasture.

"By rotating my irrigated sheep pastures, I am getting yields that make the net returns higher than for any other crop I grow except sugar beets; and, to a large extent, the fertilizer stays on the farm," says Wilkensen.

Some of Marvin Wilkensen's lambs feeding on one of his alfalfa-brome pastures.

No More Floodwater for Cimarron

By Gerald R. Riepl

One of the watershed dams helping to prevent flooding of Cimarron, in background.

CIMARRON and surrounding irrigated lands in southwest Kansas are free for the first time in many years of their periodic floodwater plague because of completion of a small-watershed protection and flood prevention project.

Chief cause of flooding was abandonment of the early-day Eureka irrigation canal, built in the 1880's to supply water for the Arkansas River valley across Gray and Ford Counties. The ditch was the inspiration of English millionaire Asa Soule, who believed that this part of the country held untold wealth if it only could be unlocked. The irrigation canal was only one of many projects he presented to this part of Kansas. He built a college at Dodge City and a railroad, among many other things.

The canal, which some say cost a million dollars, took water from the Arkansas River by a system of outlet gates, and wound around the hills for 70 miles until it reached the plains above the Arkansas River valley. It is estimated that between 3 and 4 million cubic yards of dirt were moved in building the canal—an impressive construction feat with horses and mules that provided the literal "horsepower" in those days. The canal, besides operating as an irrigation channel, also served as a floodwater-retarding structure in heavy rains.

Another of the structures helping protect Cimarron.

The irrigation system worked successfully until 1921, when a major flood on the Arkansas severely damaged the diversion intake works, and the canal was abandoned for irrigation, though it still operated as a deterrent to floods in Cimarron. But when the canal later was closed at Cimarron to make way for streets, severe flooding promptly occurred, because of the blocked drains, and became more frequent and violent. After a severe flood in 1951, an informal group of Cimarron people, organized under the Kansas Watershed Law in 1954, asked for help from the Gray County Soil Conservation District. Cimarron, with a population of 1,200, is nearly in the middle of the watershed.

A Soil Conservation Service watershed planning party started work in Cimarron in the spring of 1955, just as the area was flooded by heavy late May and early June rains totaling 12 inches in a 3-week period and 9 inches in 72 hours.

The plan developed provided for four floodwater-retarding structures and floodways to carry overflow from the principal and emergency spillways to the Arkansas River, a diversion from a drain behind one of the structures, and land-treatment measures determined by the soil conservation district. Also, as floodwater-retarding structures were completed and as needed protection was given floodplain land, work began in developing 400 acres for irrigation.

The necessary land treatment was completed and easements were obtained in 1958. When the con-

Note:—The author is work unit conservationist, Soil Conservation Service, Cimarron, Kan.

tract was let, the first soil was turned with a golden spade at a dedication ceremony in January 1959, and construction started on Project No. 1 in March.

Two floodwater-retarding structures were completed in mid-June 1959, and seeding and mulching were completed in January 1960.

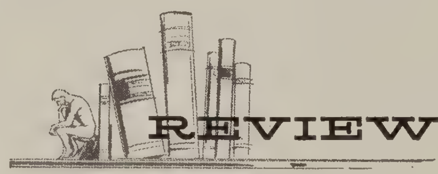
Equipment used included a mulcher, two tractors, a disk, harrow, chisel, and a straight serrated disk. The earth was tilled 2 inches deep and packed with a spike-tooth harrow. The grass was seeded with a double disk furrow-opener drill with drag chains and 12-inch spacing.

The mulch was blown on, and the serrated disk anchored the mulch to 2-inch depth.

The structures showed their potential for controlling flooding when 3 inches of rain fell within 2 weeks after completion and heavy rains with a great amount of runoff came during September and October. The principal spillway failed to flow, because nearly 100 percent land treatment above the structures, particularly with level terraces, controlled the runoff.

◆

Tests have shown that early-cut alfalfa makes better hay than late-cut alfalfa, even if it is short or has been rained on, with added nutrients in the early-cut hay offsetting the fewer extra pounds of poorer quality late hay.



OUR SOILS AND THEIR MANAGEMENT. By R. C. Donahue. 568 pp. Illus. 1961. The Interstate Printers and Publishers, Inc.: Danville, Ill. $6.50.

This comprehensive book is an introduction to soil and water conservation. It is well illustrated, easy to read, and should be of interest to the layman as well as agricultural students and land owners and operators.

Our Soils and Their Management deals with soil management. The first part of the book discusses, in some detail, organic matter, lime, fertilizers, tillage, soil and water conservation, irrigation, and drainage. The remainder of the book is devoted to the management of soils and water when the soils are used for (1) field crops, (2) gardens, (3) lawns, (4) pastures, (5) rangelands, and (6) forests. Soil and water management for each of these uses is discussed in an individual chapter. The nonagriculturist will be especially interested in the chapters on managing soils for lawns and gardens.

This is an excellent book for the beginner student in soil management. It is written in a style that can easily be read and understood by a person with limited technical background. Numerous illustrations help to make this book more interesting and easily understood. This should be an excellent reference for vocational agricultural students. Students and laymen interested in agriculture will find this a valuable book that contains a wealth of information on soils and their management.

—P. H. Montgomery

Have You Seen?---

• *Soil Erosion By Wind and Measures for Its Control on Agricultural Land*, published by Food and Agriculture Organization of the United Nations, obtainable from Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y. This bulletin summarizes basic information on wind erosion and practices for its control, including some interpretation and application of existing knowledge to conditions in less developed countries.

• *How To Control Soil Blowing*, USDA Farmers' Bulletin 2169. It gives causes of and remedies for soil blowing. Some of the measures discussed are stubble mulching, cover crops, stripcropping, crop rotations and fallowing, windbreaks, and rough and emergency tillage.

DECEMBER 1961

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

"Districts know what they want to do and why they want to do it. Their decisions may be right or wrong, but the decisions are their own."
—E. C. McArthur

VOL. XXVII, No. 5 DECEMBER 1961

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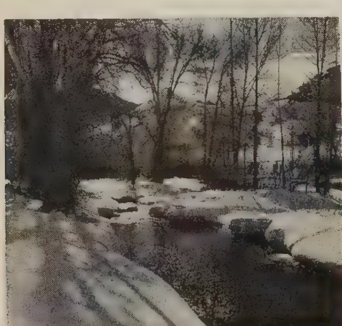

COVER PICTURE—Snow surveys made by the SCS in cooperation with other agencies and private interests provide western SCD irrigation farmers and other water users with streamflow and water-storage information that helps them plan their cropping or other operations so as to make best use of summer water supplies or to take flood-prevention steps in high-water years. Wood River in southern Idaho's Sawtooth Mountains.

Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

SOIL CONSERVATION is the official organ of the Soil Conservation Service, published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication was approved by the Bureau of the Budget, June 26, 1958.

FRANK B. HARPER, Editor

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Soil Conservation Districts Meet Local Community Needs

By Donald A. Williams

SOIL Conservation Service technical aid to the Nation's farmers and ranchers is provided primarily at the request of their own soil and water conservation districts. These locally established and managed units of State governments also take an active part in community small-watershed protection and flood prevention projects, in which the Service is responsible for both technical and financial assistance, and in the Great Plains Conservation Program which provides technical and financial help for whole farm and ranch conservation objectives.

District cooperators—the landowners and operators—have carried the brunt of the soil and water conservation effort in the United States during the nearly 25 years since this new, democratically conceived and operated force in natural resource conservation and use came into being. These self-contained conservation bodies, beholden to no Federal authority but drawing upon any Federal, State, or other facilities that advance their programs, have grown numerically and in prestige during that quarter of a century.

This growth is reflected in the recognition accorded them in the most responsible circles of our own Government and throughout the world. Many other nations have studied the soil conservation district enabling acts of our States, as well as districts' operations, as a guide to developing conservation programs of their own.

Aside from their being mainly responsible for the constantly increasing amounts of conservation we see on the land throughout our 50 States, Puerto Rico, and the Virgin Islands, one of the most significant contributions the soil conservation districts have made to resource conservation and rural area development has been that of building community conservation. Today's unprecedented soil and water conservation movement stems directly from local community action such as that represented in the districts.

Without local initiative and leadership, and full community support and participation, soil, water, and related resource conservation would not be possible in anything like the dimensions in which we are able to measure it today on the farms and watersheds of the Nation. The fundamental job of managing our soil, water, timber, grass, and wildlife resources is the province of the people who own and use those resources. Soil conservation districts, as responsible local agencies under State law, serve as focal points to bring about all-important cooperative conservation action.

The districts' pioneering in community-wide conservation paved the way for us to deal more effectively with today's changed conservation concept and broadened responsibilities resulting from urban expansion, population increase, and technical revolution on the farm. Individual conservation planning and treatment of scattered farms could not get the bigger conservation jobs done alone. The broad community conservation concept is getting it done.

Although the Soil Conservation Service has been the agency of the Federal Government most closely tied in with the work of the districts, they obtain formal cooperation from various other agencies, in cost-sharing, credit, and other help in advancing their programs. They likewise have obtained increasing financial and administrative help from the States, which have appropriated nearly $5 million during the current biennium for specific assistance to districts.

The districts similarly have enjoyed the cooperation of industry and other private interests. Business leaders have seen in their goals not only a promise for those who derive their living from agriculture, but also a major step forward for a more stable economy for both farm and nonfarm communities. Public support for the work and objectives of the districts has been advanced through the interest of press and radio, educators, the clergy, and many farm and nonfarm organizations.

The conservation planning and treatment done in the districts will continue to be basic, whatever the agricultural resource conservation undertakings with which we may be dealing. The soil conservation district truly is the Nation's agricultural resource conservation benchmark.

Successful conservation farming gives Lynn Bookhout cause enough to smile.

DISTRICT PROGRAMS Work for the Farmer

By Royce B. Brower

FROM 24 dairy cows to more than twice that number in 10 years by converting an unsuccessful cropland farm to grass farming is the soil conservation district success story of Lynn Bookhout in central New York.

Bookhout bought the 365-acre farm about 10 years ago, in the rolling to steep hills of the Madison County Soil Conservation District. The former owner grew green snap beans, wheat, and short-term hay mostly to plow under ahead of the next bean crop.

Bean rows ran straight over the hills. Erosion and water loss were common on the fairly heavy, though generally well-drained, silt loam. A number of gullies had cut into the upper subsoil, in spite of having been plowed and cultivated so that several times each year they "didn't show." Pastures characteristically were grown over with thornapple and wild apples. Hedges of elm, black and choke cherries and other species masked old field boundaries. They often also masked stone walls as the most convenient dump for stones that had been gathered off the crop fields over many years.

When Bookhout, a County Extension Agent before and during World War II, brought his 30 to 40 head of cows to the farm, he was faced with the problem of getting enough to feed them from the brush lots and gullied beanfields. The first year, he had to grow a large amount of corn, because 70 of the 130 acres of cropland already had been plowed, including some fields that had been in row crops the year before. For hay, Bookhout seeded what he calls a "shotgun mix," or anything to make feed. He estimates he produced enough feed for only about 24 head.

Before he even moved in, he had asked the Madison district for help. Soil Conservation Service technicians helped him work out a conservation plan for better use of his soil and management of water. One of the first steps he took according to plan was to seed down one field to a pasture mixture based on Ladino clover. Another field, steep and low in fertility, was seeded to birdsfoot trefoil.

The second year, some of the cropland was laid out for contour strips, with spaces left for later establishment of diversions. A basic rotation of corn, oats, and 3 years of hay was set up.

Meanwhile, old pastures were cleared and re-seeded to Ladino clover or birdsfoot trefoil mixtures, limed, and fertilized. As a result, production gradually improved to the point that it no longer was necessary for Bookhout to scour the countryside for standing hay

Bookhout reseeding a field with a grass-legume mixture, using oats as the combination crop.

Note:—The author is work unit conservationist, Soil Conservation Service, Morrisville, N.Y.

to buy. After a few years, Lynn decided to forget corn, at his 1,400- to 1,750-foot elevation, and go entirely into grass. He uses oats, which go into the silo, as a companion crop after sod is broken.

His 50 acres of cleared pasture fields are cut for hay or silage, or the "crop" fields can be pastured as well as mowed. Each field remains in hay for 4 years. His hay mixtures consist of Viking birdsfoot trefoil-Climax timothy, or Narragansett alfalfa-birdsfoot trefoil-timothy, depending upon drainage or other conditions. Planting on sloping fields still follows, generally, the old strip-cropping pattern.

The Bookhouts have built one farm pond, stocked with rainbow trout, and plan another for reserve stockwater supply. They also have, jointly with a neighbor, a marsh pond; have installed and are planning more diversions and tile drainage. They have completed improvement cutting on about 95 acres of the mixed hardwood, added cutback borders for wildlife, and planted conifers.

Lynn now has 96 head of cattle, of which 54 are milking stock. He meets all his pasture, hay, and silage needs from his own farm, with one silo for grass and another for storing 12 to 30 acres of oats a year. His DuPuits alfalfa in 1960 yielded better than 6 tons an acre, with some of it pastured off once. His milk production totaled 597,000 pounds in 1960.

Possibly the most important benefit of all realized by the Bookhouts from their soil conservation district operations is the fact that they have been able to send two sons to the College of Agriculture at Cornell University, the older of whom graduated in 1961.

What a Typical SCD Leader Does—Gratis

By Leon J. McDonald

THE voluntary services of President Lavern Fishel of the Oklahoma Association of Soil Conservation Districts are typical of the unsalaried work of district leaders over the Nation in furthering a sounder rural and total economy today and for the future.

It is "Judge" Fishel, incidentally. He is a district judge for Coal and Atoka Counties. He is not a district supervisor, but he has a basic soil and water conservation plan on his own ranch in the Coal County Soil and Water Conservation District.

Here is part of a report he made to the State association's 1961 annual meeting on his activities in behalf of fellow district farmers and ranchers the year before:

"I have traveled 10,266 miles in my own personal car on official business; attended 60 public meetings, some at night, some in the daytime, some of them longer than a day; made 210 long distance telephone calls; wrote and mailed 4,155 letters and other communications. This does not include the many hours spent in the office or on the telephone consulting various individuals concerning our mutual problems affecting soil and water conservation. Nor does it include the trips made by public conveyance, or with others with whom I was invited to ride."

Judge Laverne Fishel speaks his piece.

And Fishel's philosophy indicates why he has been so busy and is now serving his fifth term as State association president.

"People are the most important resource available to district governing bodies to get the job done. When people are informed and motivated, the conservation job will be done. We should encourage people to participate in our soil and water conservation program at the district level. . . .

"There is no more essential unit of our free government than the soil conservation district and the supervisors . . . . 'Supervisor' has become an honored title. It is honorable, dignified, and exemplifies more than any title I know the good qualities of public service."

Note:—The author is assistant State conservationist, Soil Conservation Service, Stillwater, Okla.

Yule Trees

For a Merry Christmas

By John Hultgren

One of these fast-growing Scotch pines may be your Christmas tree when Beery markets them.

ROY BEERY of Washington State near Seattle is one among many soil conservation district farmers across the country who are making sure that Santa Claus will continue to find the traditional yule trees under which to unload his pack on his future Christmas-eve visits to the homes of America.

Beery, a King County Soil Conservation District cooperator, became interested in Christmas tree farming when he served on the County Agricultural Stablization and Conservation Committee. Soil Conservation Service soil surveys showed that the best land use for his farm, between Kent and Renton, is permanent cover of trees or pasture. They indicated his land is especially good for growing Douglas fir timber.

Paradoxically, without intensive management, the trees grow too fast for good quality Christmas trees.

Another problem on his Alderwood gravelly, sandy-loam soils is that conifer seedlings normally have a hard time getting established, because of intense competition from hardwood, brush fern, and grass.

January 1 to 15, 1958—Site preparation (plowing, disking, and rowing)	$140
8,500 trees	111
January 15 to 30, 1958—Hand planting	147
Summers 1958, 1959—Cultivation	200
Total cost of establishment	$598
Cost per acre	$120

Beery was advised by the SCS woodland conservationist that, because of markets, disease, and growth characteristics, it would be advisable to plant several species of conifers to assure the best and most dependable conservation land use in his new venture. He started his Christmas tree farm in January 1958. The table shows what it cost him to establish the original 5-acre planting.

Species planted, in separate blocks, were 2-year-old Douglas fir, Scotch pine, blue spruce, and 3-year-old Norway spruce and Austrian pine. The seedlings were acquired from the Clark-McNary nursery, then located at Pullman.

Better than 80 percent of the trees survived, despite the exceptionally dry summer of 1958, and now range from 4 to 7 feet in height. Now well established, they need no further cultivation. Invading ferns and grass are con-

Beery measures 1 year's Norway spruce growth in 1958 Christmas tree plantation. Austrian pine on left.

Note:—The author is woodland conservationist, Soil Conservation Service, Renton, Wash.

rolled with a rotary mower. One area of failure, where 2-year-old blue spruce had been planted, was replanted in December 1958 to 2-year-old Noble fir and Douglas fir.

To control the trees' fast growth, of 12 to 24 inches in a season, and keep them from becoming too bushy for salable Chistmas trees, Beery shears and prunes the young Douglas fir and pine trees. The rapid-growing Norway spruce develop naturally into an acceptably bushy network of branches.

Starting in 1962, Beery plans to sell and replant 500 trees a year, with a ready local market in populous King County.

Womenfolk Get In On Soil Conservation Districts Act

By Lamar R. Mason

ARLAND Thompson's womenfolk have taken active part in his and brother Darwin's profitable conservation ranching operations in the Box Elder Soil Conservation District in northwestern Utah. The ladies in this family undertaking are Arland's wife, Glenna, and daughters Andrea and Arlene.

Besides the important jobs of cooking and housework, Mrs. Thompson keeps the books, and she and the girls often lend a hand at driving tractors, helping with the haying, and doing a thousand and one other chores, including planting and caring for the vegetable and flower gardens. In addition, Arland and Darwin depend upon Glenna and the girls to drive to Burley, Idaho, or various towns in Utah for parts and supplies.

The entire family decides on all important business matters. What they consider one of the most important of such decisions was made the evening they all sat down with a Soil Conservation Service technician around the dining room table in October 1952 and settled on the practices they would include in their conservation ranch plan. Ever since, the womenfolk have encouraged the men to speed up their conservation practices.

Arland Thompson, who has been a district supervisor since January 1956, and is the Box Elder County director of the Utah Cattlemen's Association, had reached this conclusion after they worked out their plan:

"If I don't get range improvement I won't be able to stay in business."

Studies of beef yields on his rangelands at Yost showed a yield of only 1¾ pounds of beef to the acre, because most of his range was in poor condition. Today, his seeded rangelands are producing

Arlene, Mrs., and Andrea Thompson in field of tall wheatgrass that yielded well and produced excellent gains for Hereford cattle in background in dry 1960.

Note:—The author is range conservationist, Soil Conservation Service, Murray, Utah.

Arland Thompson seeding crested wheatgrass on cleared sagebrush land.

from 12 to 20 pounds of beef an acre a year, depending upon precipitation and other climatic factors.

Starting with the purchase of the 3,100-acre original ranch in 1952, the Thompson family bought 1,260 acres from other individuals, and 640 acres of Federal rangelands. Brother Darwin owns 1,055 acres. Their operations total 6,055 acres. In addition, Bureau of Land Management and U. S. Forest Service permits are an important part of their operation.

A 1952 inventory showed that only 141 acres were in "fair" condition, with the remaining acreage in "poor" condition. They since have seeded 1,230 acres, or 74 percent of their goal, getting good grass stands despite dry years and heavy rabbit damage.

The Thompsons frequently review their ranch conservation plan to keep their work up to date.

Arland reminisced while standing in a seeding of tall wheatgrass: "We have developed more feed on these 50 acres than the full section had on it before."

The Thompson brothers base the numbers of livestock grazed on the time that they graze each range area and on the amount of forage it produces each year. This usually is slightly more or less than 2 acres an animal-unit-month on tall wheatgrass, and from 2.5 to 5 acres on crested wheatgrass.

In addition to range seeding and proper grazing use, conservation measures on the Thompsons' irrigated lands include three storage ponds and 45,000 feet of improved ditches for more efficient application of their usually limited irrigation water supply.

Harvesting their own crested wheatgrass seed has enabled them to seed a greater acreage in a much shorter time than they could have otherwise.

Faced with declining forage production, the Thompsons, along with other public land permittees in the Yost area, launched an improvement program in cooperation with the Forest Service and the BLM.

Before then, this area was stocked at the rate of 30 acres an animal-unit-month, but, through seeding, was improved to 5 acres an animal-unit-month in 1955, 1956, and 1957, and in 1958 and 1959 to 4 acres. Beef production has increased from around 2 pounds an acre to between 15 to 20 pounds an acre on these crested wheatgrass areas.

The crested wheatgrass pasture —especially the 2,500-acre BLM seeding—has been, in the Thompsons' words, "a life saver," when they have faced adverse conditions of drought, rabbits, permit cuts, and low cattle prices. They now have enough private and public land allotment seedings to weather extreme conditions.

From a range so poor that 30 acres were required to support an animal unit for a month, the Thompsons have improved more than 1,000 acres of their rangelands to productions ranging from 1 to 4 acres to support an animal unit for a month; and their native ranges are also improving as a result of leaving half of each season's growth of the key forage plants each year to make vigorous, healthy, fat forage plants.

◆

In their nationwide Golden Jubilee project devoted to conservation service for 2½ years, the Camp Fire Girls made 1,000 plantings for erosion-control work and installed a number of deflector dams and check dams. They also planted millions of acres of trees, surveyed more than 1½ million acres of land for recreational uses, built shelters and birdhouses, and provided food for fish and wildlife.

◆

The 1962 meeting of the American Society of Range Management will be held in Corpus Christi, Tex., January 23 to 26. Topics which will be discussed include: Rangelands of the Southwest and Mexico, range management advancement through cooperation, range production and economics, research methods and techniques, range wildlife, international cooperation in grassland management, history of the range, range improvement practices, and range condition and trend. Also on the program are a trip to the King Ranch, and other optional tours.

◆

Colorado State University-USDA tests have shown that leaching silts from slightly saline soils may reduce evaporation losses 25 percent and save 12 percent in the amount of water needed to grow crops.

Conservation Saves Tax $$ On Institution Farms

By Leon J. McDonald and John O. Helein

RESIDENTS of Oklahoma's State Institutions are being fed better at less cost to the taxpayers because of soil and water conservation programs being used on their farm and ranch lands.

State Farm Coordinator J. D. Ferris has insisted that institution farm supervisors take full advantage of help available through their local soil conservation districts. The Soil Conservation Service work unit conservationist assigned to the local soil conservation district works with each institution's farm supervisor to develop a basic conservation plan that is "tailor-made" for the operating unit, and the needed conservation practices are applied as rapidly as possible.

The conservation program in effect on lands operated by the Eastern Oklahoma Hospital at Vinita is typical. Superintendent P. L. Hays of the hospital says, "The food produced on the farm has saved the institution about $1 a day per patient."

Its conservation plan was started in 1954, and today the 2,116-acre farm is a model of soil conservation. Almost 10 miles of terraces have been built. More than 250 acres of pasture have been planted. An excellent bermudagrass-clover pasture has been established on 150 acres. A hay and pasture rotation is being carried out on another 200 acres. Three ponds have been built to provide water for livestock and for recreation. A conservation cropping system is being applied on 600 acres of cultivated land.

Vegetables in contour 2-year strip-crop rotation with hay on Templeton Colony school farm.

Manager John A. Hightower of State School for Boys in Garvin Co., Okla. (right) and SCS WUC Sam Lowe plan future conservation work.

When the program was started about 6 years ago, the 90-cow dairy herd averaged only 16.6 pounds of milk a day. For the 5 months of April through August 1959, the sharply increased herd of 132 cows averaged 49 pounds of milk a day.

Records of conservation plans involving 15,842 acres at nine Oklahoma institutions show that 99 miles of terraces have been built and 31 waterways built and grassed. More than 2,500 acres of formerly cultivated land have been revegetated and are producing abundant forage for dairy and meat animals. Eight irrigation systems involving 694 acres have been developed. A rotation system of hay and pasture is being applied on 1,342 acres. The conservation cropping system is maintaining and improving the productivity of 5,046 acres. Conservation drainage-improvement systems

Note:—The authors are, respectively, assistant State conservationist, Stillwater, Okla., and work unit conservationist, Barre, Mass., both of the Soil Conservation Service.

have been applied on 510 acres.

The W. E. Fernald State School for retarded boys at Templeton, Mass., is another working example of how taxpayers all over the country are saving money as a result of soil and water conservation systems being used on institutional farms.

When conservation-minded Henry Weidlich became head farmer of the popularly known 2,500-acre Templeton Colony 9 years ago, he found much of the farming land to be stony, steep, and wet, with only 100 acres of tilled land cleared from woodland. Erosion was severe in several fields, and drainage was needed on others. The colony provided forage for only 36 cows, and pasture had to be rented for young stock. There were 3 silos and 5 old barns. Hay production averaged about 1½ tons an acre. Vegetable production was below average. No conservation forestry work was done except harvest cutting for lumber. The farm was capable of providing a home for only 260 boys.

Working through the Northwestern Worcester County Soil Conservation District, Weidlich worked out a conservation farm plan with Soil Conservation Service technicians, based on his soils map and farm needs. The eroded fields were planted to fertilized legumes and grasses. Steep land was contour stripped in a conservation cropping system of corn and hay. Sod waterways were installed. Stones and stone walls were removed, and pasture rotation, now totaling 134 acres, and deferred grazing soon were possible. Additional tile drainage and ditches were installed in wet fields.

The school farm's dairy herd has been increased to 150 milkers and 70 young stock; and total livestock, including horses, oxen, and bulls, number approximately 250 head. Four silos and new cow barns have been built, to hold the 900 tons of silage produced for year-round feeding, out of total corn and grass silage production of 2,000 tons and 1,000 tons of hay. These crops are grown on 40 acres of cornland and 335 acres of legume-grass hayland, in a stripcrop rotation system.

Sixteen acres of contour stripcropped vegetable fields, in a rotation of 2 years of vegetables and 2 years of hay, now meet the needs of 375 boys, who receive conservation and other agricultural training, and 100 employees at the school, and grow winter storage-type vegetables for other State institutions. Approximately 1,000 timbered acres have been thinned or pruned and harvest-cut, under direction of the district forester, for use of the farm and other State institutions, on an average of 100,000 board feet a year.

Conservation farm plan progress being checked by (left to right) SCS WUC John A. Helein, Head Farmer Henry Weidlich, and Farm Coordinator James Mistark of W. E. Fernald School.

Savings to the taxpayers from the improved production that has resulted from the school farm's conservation system is estimated at $20,000 to $30,000 a year. Its 150 milking cows were second in production in the United States in 1960, being topped only by a similar herd in California.

"There is no limit to the future of soil conservation," Weidlich says. "Our recently revised conservation farm plan has been designed for the next 10 years. Modern farming requires long-range planning, especially with a large herd."

Weidlich was chosen Award Winning Conservation Farmer for 1960 by the Northwestern Worcester district.

◆

No wind erosion here! Western State Hospital's farm supervisor, John Nemeck, checks on Duroc brood sows grazing supplemental pasture.

Scientific talent is especially needed in agriculture.

Dedicated Conservationist

DON Hill is a man long dedicated to the cause of conservation.

Hill helped organize the Douglas Creek Soil Conservation District in Colorado in 1945, and has served as a supervisor ever since and as chairman to early in 1961. In summer months he travels 90 miles over a treacherous mountain road to board meetings, which he seldom misses. He also is a member of the Uintah Basin Soil Conservation District of Utah, into which his ranch extends.

Having seen personally the disastrous results of range exploitation, Hill is proving through his own sound conservation plan and program that the scars can be healed and the range brought back to the productivity he remembers.

The Hill ranch stretches from the desert country at Rangely, Colo., where he was born in 1892, to the high summer ranges atop Baxter Pass, 90 miles to the south. His patented land lies in three counties in the two States.

The ranch covers an area rich in unwritten history. The ghost towns of Dragon, Watson, and Rainbow Junction mark the course of the old Uintah Railroad narrow-gage mining line. Chipeta, wife of the noted Ute Indian chief, Ouray, lived and died on the Hill ranch.

Hill's father and grandfather came from New Hampshire and homesteaded in 1882. They ran Texas longhorns and mixed shorthorns until 1915, and the senior Hill operated an Indian trading post to supplement the family income. None of Don Hill's holdings came to him the easy way.

First, starting in 1904, was a drawn-out struggle, in the courts and out, to hold onto the homestead against attempts of a sheep company to refile and take over the Hill land. The Hills proved they didn't scare. The courts finally decided that the Hills' claim was valid.

Then came the winter of the big blizzard in 1915-16. Cattle were herded to the railroad to be fed hay in a country where cattle normally graze the range year long; but the trains were snowed in and couldn't

Don Hill.

keep the feed coming; and cattle died by the thousands. While many cattlemen were going broke that winter, Hill gambled on leaving his cattle on the open range. Although his losses were high, most of his herd found feed on high, windswept ridges and survived.

Next, in 1919, came a 3-year war against timber wolves. One pair killed 60 of Hill's best cows. The extermination of one wolf alone involved an 8-day trek over 200 miles of the roughest country. But his victory over the wolves was decisive, and they never have returned.

Finally, in the early 1920's, the bottom dropped out of the cattle market, and ranchers sold livestock at 6 cents on the dollar. The Hills refused to sell; confiscation proceedings fell flat, because Hill cattle could not be found; and when the market went up in 1926, Don Hill met his obligations in full.

By World War II, the homestead on Bitter Creek had become a ranch of 150,000 acres supporting 1,500 cows.

Hill has served for 7 years on the executive committee of the National Cattlemen's Association, is a director of the Utah Cattlemen's Association, and an active member of the Colorado Cattlemen's Association.

His son, Harry, who also is an avid conservationist and is following in his father's footsteps, represents the fourth generation of Hills on the ranch.

—ELLIS F. SEDGLEY

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Agriculture offers young men a greater variety of jobs than almost any other industry. In business, education, engineering, science, or technology, talented youths can find outstanding opportunities in agriculture. At least 40 percent of all jobs available in the United States today are related to some phase of agriculture.

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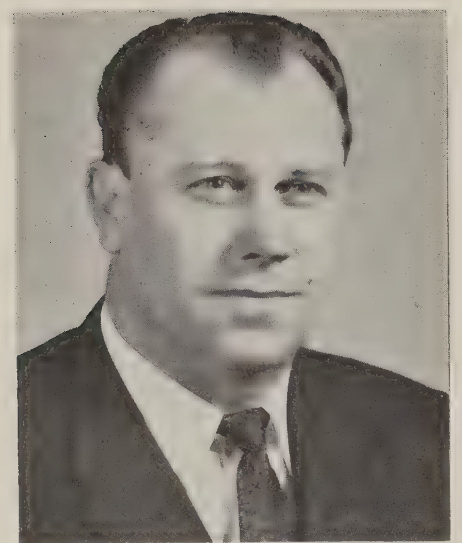
The average farmer can do as much soil building in a few years as his grandfather could do in a lifetime, because he has better tools and more advanced technology with which to do the job.



William E. Richards.

Conservation D

By Will

THIS is an appropriate time for taking stock of our Nation's soil and water conservation districts on the eve of the 25th anniversary year of one of the most far-reaching movements in the history of American agriculture.

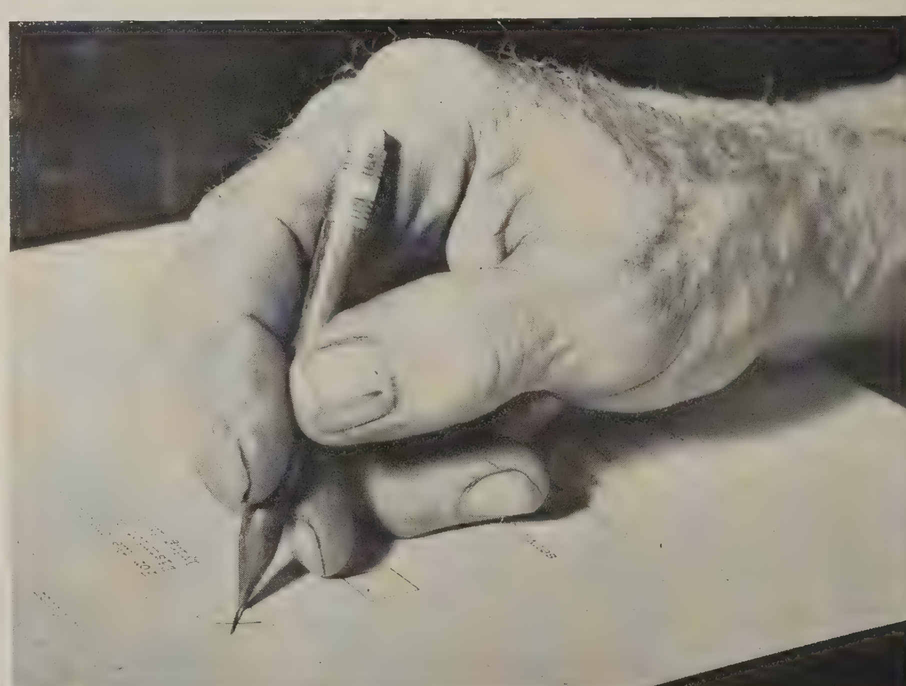
Farmers and ranchers of the 50 States, Puerto Rico, and the Virgin Islands share the pride of purpose and accomplishment that have borne witness to the soundness and practicability of the districts concept since the first of these local units of State government was voted into being a quarter of a century ago. That was the Brown Creek Soil Conservation District in Anson and Union Counties, N.C., organized under a State enabling act on August 4, 1937.

Between that historic date and July 1, 1961, the number of conservation districts had grown from only 1 to exactly 2,900! These democratically conceived and locally organized and managed districts today include within their boundaries 92½ percent of all the country's farmlands, and 96 percent of its farms and ranches. Millions more acres not being used for farming or ranching also are included in the districts.

Twenty-three States now are completely covered by districts, as are Puerto Rico and the Virgin Islands; and all the rest of the States but one are from two-thirds to 90-plus percent covered. There are only about 200 agricultural counties, out of a total of approximately 3,000, where landowners have not yet organized districts under their State laws.

These soil and water conservation districts are not just "paper" organizations: At the beginning of the present fiscal year, nearly 1.9 million landowners and operators were cooperating with their districts in planning and applying soil, water, and plant conservation on their lands. Already, 1⅓ million of these cooperators had basic conservation plans in effect, and the others were in the process of developing and applying such plans. During the last year, about 116,000 farmers and ranchers joined the ranks of district cooperators, and 102,000 were fortunate enough to get help in working out their basic farm conservation plans. Thus it is that the inevitable backlog of as yet unreached landowners and operators is being whittled down year by year.

The total number of farmers and ranchers operating within soil and water conservation district boundaries is 4⅓ million. They include the new district cooperators of the future, as individual districts' technical and other facilities for helping them to farm the scientific conservation way become available. In the meantime, those who are not yet cooperators must bide their time while awaiting their turn to avail themselves of conservation aid from their local districts.



Farmers and ranchers vote for their conservation districts.

ricts in Action

chards

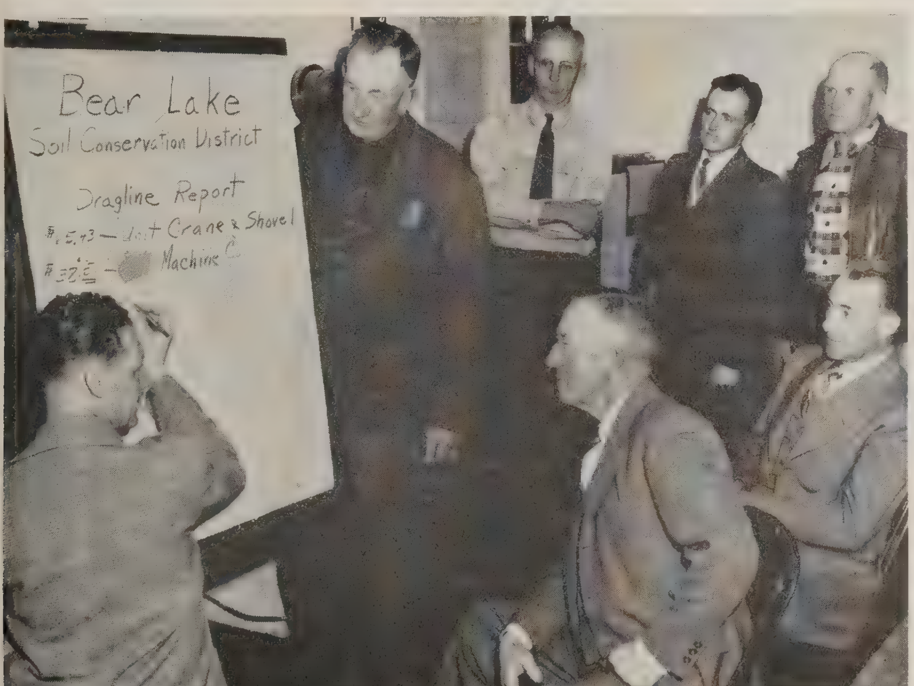
America's soil conservation district farmers are proud of what they have to show (North Dakota).

This phenomenon of soil conservation districts in American agriculture has not come about through happenstance. It has resulted from the fast-awakening desire of those who manage the Nation's privately owned agricultural and water resources to strengthen their position and insure these basic assets against the hazards of the present and the future. It has come about through hard work and serious devotion to that purpose by all of those farmers and ranchers who are district cooperators, and by those who serve voluntarily and without pay as the managers of district affairs. And it has come about through a growing understanding on the part of responsible public officials—Federal, State, and local—and the consuming public generally, of the vital necessity of safeguarding the source of our food and fiber for the future security and well-being of our fast-growing population.

Unfortunately, the last-named contributing factor to district progress is still our weakest link. If there is a single, overriding conservation challenge as we move into 1962, it lies in the area of public understanding. There still are too many people who do not fully understand either the present or prospective problems of managing our limited supplies of land, water, timber, grass, and wildlife resources. Understandably, they are likely to be more preoccupied with such headline subjects of the day as taxes and the cost of living, atomic bomb testing, and West Berlin—and, the quest for a new "farm program" to dissipate present temporary surpluses of a few farm commodities.

The public needs to know, however, that our per-acre production of essential crops must double by the year 2000 in order to meet the needs of a United States population estimated by the Bureau of the Census to total as high as nearly 420 million by the turn of the century. Also, that our water requirements will double by 1980, or less than two decades hence.

How well are we preparing for these future drains upon our soil and water resources? We are learning more through agricultural research. We have, in the soil conservation districts, the means of applying local initiative and responsibility to the job ahead, on individual farms and ranches, including those in the Great Plains Conservation Program, and through community-wide watershed-protection and flood-prevention projects. We have able Government agencies, including the Soil Conservation Service, Forest Service, Agricultural Stabilization and Conservation Service, Bureau of Land Management, State Agricultural Experiment



Supervisors about their district's business.

Note:—The author is president of the National Association of Soil Conservation Districts, Holdrege, Nebr.

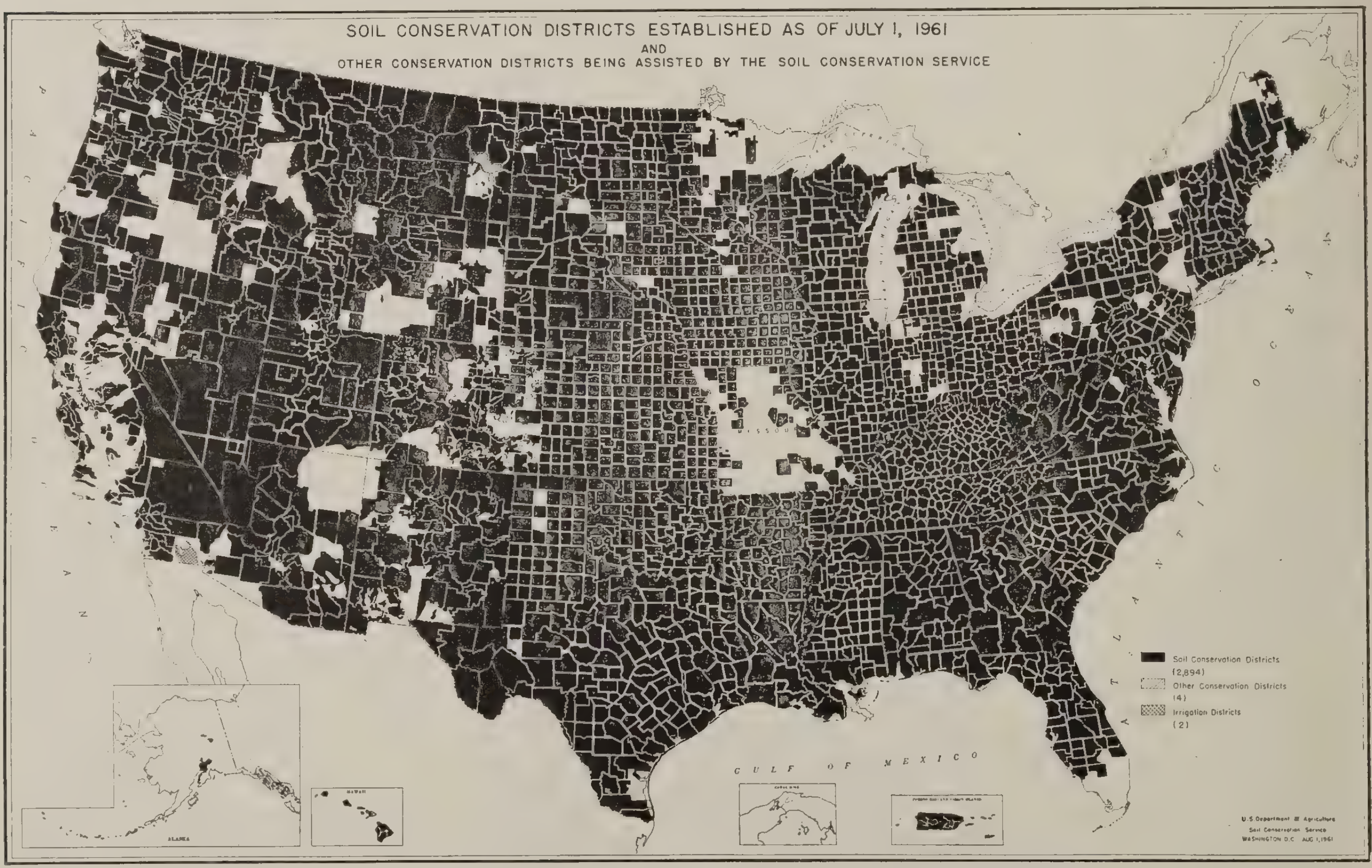
District officers keep tab on conservation progress on the land (Culpeper SCD, Virginia).

Stations and Colleges, and other fine State and Federal resource agencies on the job. What we need most, then, is sustained public interest in and backing for the work of all these agricultural resource betterment forces.

Two trends, or developments, in more recent years have intensified the responsibilities and opportunities of our approximately 14,500 soil conservation district supervisors, directors, or commissioners to lead the way for agricultural resource conservation for public and national benefit. One is the burgeoning metropolitan movement that has seen land going out of agricultural use at the net rate of a million acres a year as those areas continue to bulge at the seams. The other is the increased attention being given to rural development of a kind that means better farming, community business, recreation, and other benefits for rural America, especially in areas where income and living standards are being held back by underemployment of the people.

Metropolitan or rural, virtually all of the areas involved fall within soil conservation districts. We who have been elected by our fellow landowners and operators to look after district business—local, State, and national—have an overriding obligation and an impartial interest in doing everything within our province to meet these newer challenges in stride.

Without in any way attempting to take credit for carrying the world on our shoulders, I think I can say truthfully that we in the soil conservation districts—from the senior supervisor to the newest cooperator—are making as substantial a contribution to a better and more secure America as ever has been made since our forebears touched the uneroded shores of this land of unbounded soil, water, forest, grassland, and wildlife resources.



Farmer-organized and managed soil and water conservation districts—2,900 of them—include 96 percent of the Nation's farms and ranches and 92½ percent of its farmlands.

SCD Plan Means College For Michigan Youngsters

By Wendell Somers

FARMING their 320-acre farm the soil conservation district way in Eaton County is a family affair for the Albert Nelsons of Michigan.

Their 37 Holsteins earned a place on Michigan's 400 Honor Roll, averaging 447 pounds of butterfat and 12,169 pounds of milk to the cow for 5 years. But here is the most important payoff to the Nelsons from their profitable conservation farming:

Son Russell will be able to attend the 1962 Michigan-State University Short Course on Dairying and Farm Management after graduating from Eaton Rapids High School last spring, so he will be better prepared to help handle their planned expanded 60-cow or larger herd.

Daughter Dorothy, chosen 1961 Dairy Princess for Eaton County and a participant in the competition for Dairy Princess of Michigan, was able, after also graduating from Eaton Rapids High this year, to attend Lansing Business University.

Things could have been different for these youngsters if it had not been for Albert Nelson's taking up the soil conservation district way of farming; because, as Mrs. Nelson said, "When we moved onto the original 200 acres 19 years ago, in 1942, we were 100 percent in debt."

The Nelsons' farm is mostly level, heavy, and wet, with 216 acres of cropland. Eighty acres were in muck, which is gradually being reclaimed. The farm was badly run down, needed lime, and was low in fertility. Soil structure was poor, further aggravating drainage and resulting in low yields. It was nearly impossible to raise alfalfa.

"We originally planned cash cropping, but low production discouraged us," Albert explained. "In about 3 years, we changed our minds completely. If I had known more about soils as far as capability, fertility, and tilth are concerned when I bought the farm, I never would have started on a cash-crop venture."

The Nelsons—(left to right) Mr. and Mrs., Russell, and Dorothy.

In 1946, he helped organize the Thornapple-Grand Soil Conservation District in Brookfield Township. An early cooperator with the district, he developed a complete basic conservation plan for his farm in 1950.

"How much easier farming would have been for us if we could have had a farm plan when we started farming," he said. "It would have provided us that valuable inventory of what we had to work with. The farm plan based on capabilities of our land was the turning point in our farm operation. It gave us a schedule of operations to follow in applying needed soil and water conservation practices, developed with the help of the Soil Conservation Service through our soil conservation district.

"Since becoming a district cooperator, our alfalfa production has reached 4½ tons, or three times the original yields. New varieties, of course, have also contributed to yield increases. Corn and oat production has doubled since 1950, now standing at 90 to 95 bushels of shelled corn and 100-plus bushels of oats to the acre. The production of the entire farm has steadily increased over the past 11 years, and is continuing to increase. The quality of feed has improved, contributing to increased production from our livestock. By comparison, some of our first attempts were feeble."

Improved drainage on the Nelsons' farmland was the conservation measure which made it possible to apply other conservation practices. They followed through with a good rotation, minimum tillage, and cover and green manure crops. They leave crop residues on the land over winter and make liberal applications of

Note:—The author is work unit conservationist, Soil Conservation Service, Charlotte, Mich.

their dairy barnyard manure. They also have increased their use of commercial fertilizer.

"We have tried to apply ideas that would fit our farm situation, not necessarily what someone else did," Nelson senior explained. "We look at needed conservation practices as investments rather than costs. Back in 1951, this was a bitter pill to swallow. We knew alfalfa was needed in the rotation. Other costs had been considerable, and alfalfa seed was not cheap. It was rather difficult to see it as an investment, especially when Mrs. Nelson was saying that her 200 hens were making more money than the 12 dairy cows."

Today, the Nelson family—Albert, Mrs., and the kids—face the future with confidence. They know that sound conservation practices applied on the land in accordance with their soil conservation district plan will continue to help them live more abundantly.

Owner-Renters and Landlords All Profit From SCD Program

By Charles A. Holden, Jr.

BROTHERS Jim and Bob Varner have a reputation for hard work and lots of it among their neighbors around Oskaloosa, Kans. They began farming after their father died while they were still in grade school.

In 1948, they became cooperators of the Jefferson County Soil Conservation District. Over the years, they have built a production farm, with help of a complete conservation program that has brought about the improvement of 300 acres of rented ground as well as 400 acres of their own.

The Varners' successful accomplishments illustrate how landowner-operator, renter, and landlord alike benefit from farming or ranching systems worked out through their soil conservation districts with technical help from the Soil Conservation Service.

Cattle grazing wheat on abandoned cropland terraced and reclaimed by the Varners.

They grow alfalfa and clovers extensively and use good crop residue practices on both the rented ground and on their home place. They persuaded their landlords to build waterways and terraces, and have put them on their own Class III and IV croplands. Proof of the value of their system is increased per-acre grass and other yields, reduced erosion, and better profits. One landowner, skeptical at first, has rented to them for more than 10 years.

In 1957, Bob and Jim started in on a 240-acre farm they had bought, most of it Class III and IV land. Originally, the soil was fertile, but erosion and continuous cropping had reduced the fertility and productivity to a point where no one tried to farm it for years. The farm was foul with weeds.

A previous owner had built and seeded one waterway. Within 2 years, additional waterways were established and all the cropland terraced. Gullies were filled and floated level and smooth. Many

Note:—The author is agronomist, Soil Conservation Service, Topeka, Kans.

Good crop residue in winter wheat stand on terraced and contoured land on the Varners' farm.

hours were spent clearing the fields of stones.

Just as soon as the dirt work was finished, lime was spread and milo was planted on the contour. Fertilizer was applied on the basis of a soil test. Yields of milo in 1959 ran as high as 80 bushels an acre, with some spots in the fields making 104 bushels. The county average was a little more than 40 bushels an acre. Wheat followed the milo, to be overseeded with red clover for green manure in 1961.

Two consecutive years of milo were used to help rid the soil of weeds. The Varners planned to use wheat later for a second year, and to follow it with alfalfa for 3 or 4 years. They use a 24-inch serrated blade to handle the milo and wheat residues, and to reduce tillage operations. Wheat residue that had been disked once was found to weigh more than 3,000 pounds an acre on the surface, with an estimated additional 1,000 pounds mixed with the top inch of soil. The big disk leaves the surface rough with the stubble well anchored, thus helping to cut down on erosion and build soil fertility.

The Varners also have used the disk to seed 71 acres of cropland to smooth bromegrass pasture and to clear and reseed another 164 acres of steep and wornout, unproductive, rocky, brush pasture to improved tame pasture. Total cost of clearing the land and seeding it to alfalfa and smooth brome pasture was estimated to be about $6 an acre, but it has paid off.

The pastures are divided into 40-acre units, with each pasture grazed only 2 or 3 weeks before the cattle are moved to another. Generally, at least, 4 inches of growth remain after the stock is removed. Grazing begins about April 26, or when there is 6 inches of new growth, and continues until mid-July. During the summer, the cattle are moved to deferred native or other bromegrass pastures, and come back onto the brome about September 1, grazing it until late November. Wheat pasture carries them through the winter.

Last year, 160 acres of renovated pasture carried 40 cows, 40 spring calves, and 2 bulls. The Varners' beef production is estimated at 350 pounds to the acre. In addition to grazing, one 80 acres produced 14,000 pounds of good smooth bromegrass seed.

SCD Programs Mean Better Hunting-Fishing AND Farmer-Sportsmen Relationships

By George L. Jessup and Charles L. Limeberry

SOIL and water conservation districts are proving to be effective in bringing farmers and sportsmen into harmonious relationships in hunting and fishing on the Nation's privately owned farm and ranch lands that make up 80 percent of its hunting grounds.

Now covering more than 92 percent of the country's farmland and 96 percent of its farms, these farmer-owned and managed districts' 1,850,000 cooperating farmers and ranchers are in position to influence a major part of upland game and other hunting, as well as much farm-pond and private stream fishing upon which sportsmen depend.

Their experiences reported around the country reflect the contribution they are making to better hunting and fishing for the public.

In Sacramento County, Calif., for example, wildlife has found understanding friends in the farmers and ranchers of the Florin Soil Conservation District. Here, as in many other parts of the country, wildlife long has needed a helping hand. Much of its natu-

California 4-H Club members making wildlife habitat planting.

Note:—The authors are, respectively, soil conservationist, Florin, Calif., and work unit conservationist, Clarkston, Wash., both of the Soil Conservation Service.

Wildlife plantings on both sides of enclosed California sump.

ral habitat had disappeared with accelerated development of farmlands or was being swallowed up by fast-growing urban developments.

A "big brother" wildlife movement got started in the district when Directors John Mensch and John Sikich organized an 11-man committee and an advisory board of 8 members, to see what could be done about making a better home for wildlife as a part of conservation farming.

Conservation meetings were held monthly, and a wildlife and habitat restoration program began shaping up. Soon the Sloughhouse and Lower Cosumnes Soil Conservation Districts teamed up with the Florin district, and a wider area of treatment was taken in. Letters to cooperators and press stories helped enlist 29 farmers in the program.

The California Department of Fish and Game and Soil Conservation Service technicians checked wildlife food and coverplanting sites offered by farmers. Then they made planting plans and provided tests of food and cover plants from which to order.

State and county appropriations solved the financial problem. The California Soil Conservation Commission allocated $1,500 from its funds, and the program qualified for a matching sum of $1,500 from the Sacramento County Fish and Game Fund.

Replanting of habitat is designed to fit into a farm plan by using odd corners of land not farmed, fence rows, ditchbanks, and edges of ponds or sumps. New habitat also is planned.

To keep wildlife developments going in the three districts, the committee sponsored a junior wildlife program, with SCS technicians helping 4-H Club and Future Farmers of America leaders work out conservation plans based on wildlife needs in their communities.

Experience in these California districts has shown that the unattached hunter still needs to be brought into wildlife planning, and that many hunters, if asked, would help landowners to plant, improve, and maintain wildlife areas. Several district cooperators have successfully enlisted such assistance by hunters who hunt on their farms or ranches.

And up in the Asotin County Soil Conservation District in southeastern Washington State, improvement of basic wildlife requirements for food, cover, and water is resulting in more stable game populations and insuring sportsmen good hunting for the years to come.

Farmers applying farm conservation plans to their lands are using such practices as stripcrop-

Farm pond and planted pasture give game birds water, cover, and food on Dick Petty farm in Asotin County (Wash.) SCD.

Washington State Boy Scouts installing plastic cistern for wildlife water.

ping, grassed diversions, terraces, and waterways for erosion control. Grasses and legumes are seeded as permanent pastures or as a part of a conservation crop rotation. Springs are developed and ponds built to provide water for livestock. These measures, interspersed with crops of small grains, provide basic needs for maximum wildlife populations, including many miles of habitat "edges" for game birds and other wildlife, where one practice ends and another begins. Along with the edges are stock-water developments which multiply the wildlife benefits.

The Robert "Dick" Petty farm is a good example of how pasture development, crop rotations, farm ponds, tree windbreaks, and other conservation measures have improved ringneck pheasant and other wildlife habitat, including that of hungarian partridge and quail, mule deer, and occasional elk. He can remember when his farm was the home of the prairie chicken. Today they are gone; but continued existence of their successors, the pheasants and other upland game birds, is assured on the Petty farm.

Two other programs are contributing to wildlife-habitat improvement in the Asotin County district: The Conservation Reserve Program has resulted in the seeding of more than 9,000 acres of grasses and legumes which provide food for deer and elk, pheasants, quail, and partridge.

Meanwhile, the Washington State Department of Game and the district are promoting the installation of wildlife-watering facilities in the drier parts of the district, with Boy Scout units helping with the installation of 500-gallon plastic cisterns supplied by the Game Department.

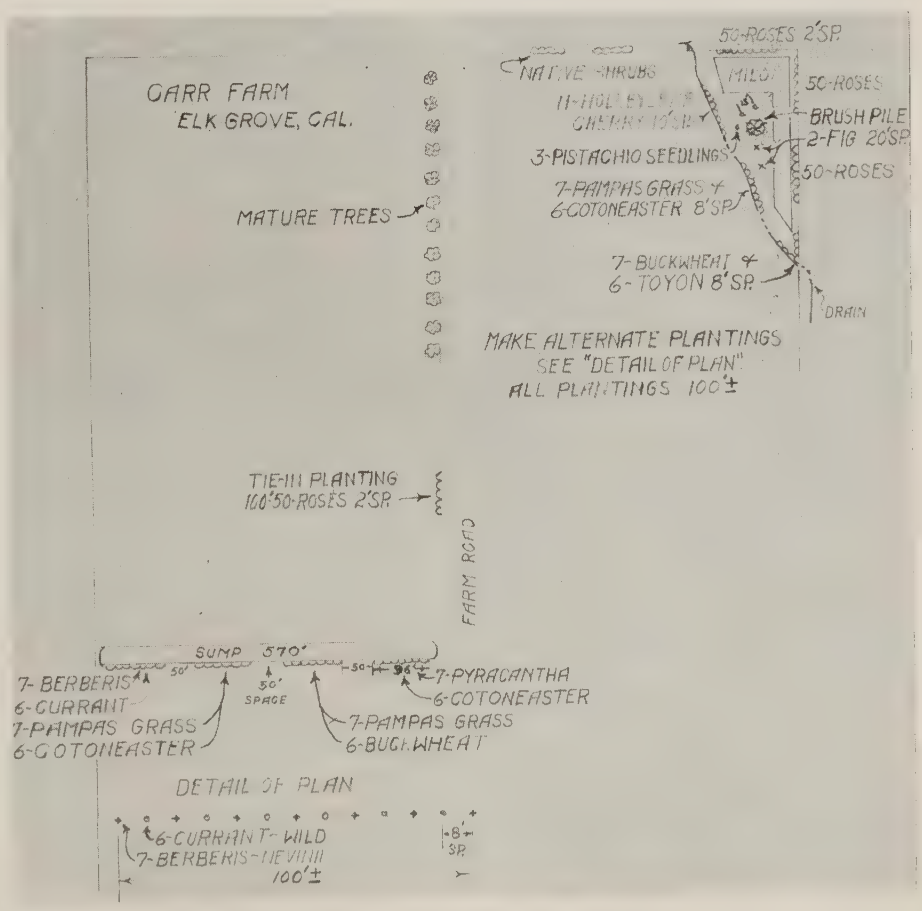
Eight of these cisterns were installed in the Dry Gulch area by four farmers—Francis Fitzgerald, Archie Glaassen, Bud Ingram, and Paul Nolt—who control more than 4,000 acres. They entered into a cooperative agreement with the Asotin County district and the Washington State Department of Game to allow hunting on their lands and to apply certain conservation practices, in return for technical assistance from the district and the department.

The Dry Gulch project is another example of farmers' helping to insure game populations for the benefit of all sportsmen, rural and urban, even though only one of the four farmers hunts upland game birds himself!

An effort is being made to expand the Dry Gulch project to adjoining cooperators, who frankly said they wanted to watch the results of the Dry Gulch sportsmen-farmer relationships before committing their lands to such a project. One farmer expressed the attitude of many of his neighbors when he said:

"When I'm convinced that hunters can read those signs the game department gives us, I'll join the project."

He was looking at a sign calling for hunters to respect the farmer's property. It had been shot full of holes!



Wildlife planting plan.

Where Men Are Men

SCD Program the Hard Way

By C. Saulisberry

NORTHWESTERN Nevada's 2⅓ million-acre Vya Soil Conservation District adjoining California on the west and Oregon on the north is one of the most isolated of the Nation's 2,900 farmer- and rancher-owned and operated districts despite the fact that its nationally known county seat of Reno is the State's second largest population center.

Reno, however, is some 150 miles from the district boundary, over dirt roads within the district that may make the distance seem three times that far. Until last year, this district was probably one of the few in the entire country without a paved road, post office, gas station, or school. Then Humboldt County, in which lies that part of the Vya district that is not in Washoe County, paved a 30-mile section of road.

Some 500 miles of unimproved dirt roads remain in the district. During years of average precipitation, they are all but impassable, because of snow or mud, 3 or 4 months a year. Consequently, little activity is carried on in the district during the winter months.

In addition to several resident ranch families, the main winter population consists of personnel of the U.S. Fish and Wildlife Service's Sheldon Antelope Refuge, which covers more than half a million acres, and a county road maintenance station that keeps a small crew on hand at Vya, the district's single community. Telephone facilities are available at only three or four locations, and electricity is almost nonexistent. This handful of year-round residents must travel to Cedarville, Calif., or to Denio, Winnemucca, or Gerlach, Nev., for their mail and supplies.

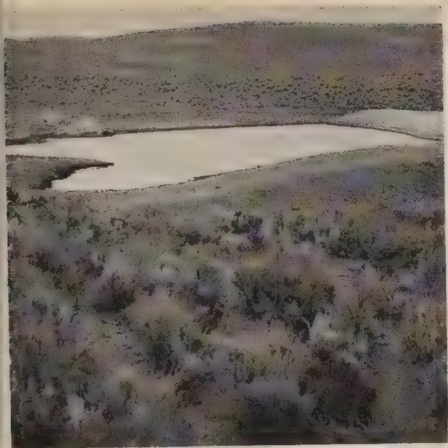
Rancher Grady Henderson displays bob-cat bagged in the Vya SCD as proof that his shooting eye is good.

View from Mosquite Valley south into Long Valley shows vastness of Vya SCD. Part of its program is to get former grainlands (center) into grass.

Significant historical events are tied into the early West at several locations in the Vya district. Parts of one of the main emigrant trails to California and Oregon that wound its way through the northern part of the area still can be traced through much of its route. In 1911, four stockmen from the Cedarville, Calif., area investigating cattle rustling reports on their ranges near Little High Rock Canyon were ambushed and killed in what locally is considered the last "Indian massacre" in the West.

The economy of the Vya district is based primarily on livestock

Note:—The author is soil conservationist, Soil Conservation Service, Cedarville, Calif.



New stock-water pond on the Cramton range.

grazing by some 35,000 head of sheep and cattle during the spring-through-fall seasons, mostly on public domain lands in eastern Modoc County's Surprise Valley area of California. Dryland grain farming was carried on extensively in the Long Valley area of the district during the 1920's and early 1930's, but because the land was marginal for cultivation, only limited amounts of grain are grown today. Most of the former dryland grain lands have been planted to range grasses.

Few large sources of water are available for irrigation in the district. As a result, most of the ranch units get only early irrigation and must depend on drought-resistant grasses and legumes for

This tall wheatgrass broadcast seeded in 1953 by Rancher M. R. Toney is grazed in spring and fall.

hay and pasture. Water is being developed by building storage dams wherever they are practicable, but 8 to 10 inches of annual precipitation does not produce heavy runoff.

It was in 1954 that area ranchers decided they could use some help in solving their conservation problems and formed the Vya district under the laws of the State of Nevada. All but one of the members of the district governing board live in the adjacent Surprise Valley area of California, and are active operators and landowners in both States; and of the 65 operating ranch units in the district, about 50 are headquartered in Surprise Valley.

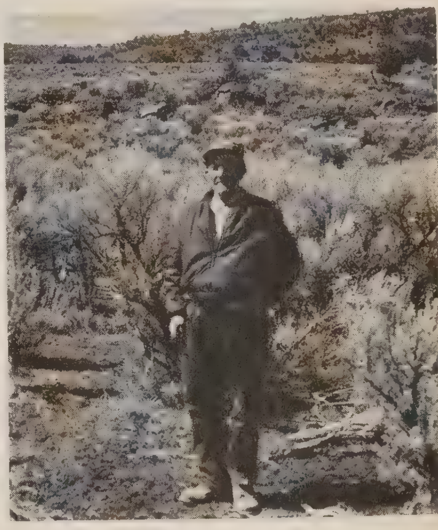
The Soil Conservation Service office in Cedarville, Calif., gives technical help to the Vya district and also to the Surprise Valley district in California. Because of the remoteness of the Vya district and the hazardous travel conditions, SCS vehicles have 2-way radio units for communication, tied into that used on the Sheldon Refuge by the Fish and Wildlife Service.

High on the list of district problems is that of water development for livestock and irrigation. Bide Steward, longtime rancher, says that "Stock-water development is probably the greatest single need in the country. With this problem solved, the other conservation practices will logically follow." Other objectives include erosion control, improving use of irrigation water, improved grasses for range seedings, and range livestock management.

Since 1954, four irrigation dams, storing approximately 6,000 acre-feet of water, have been built, and six other projects are in various stages of consideration. Some 170 stock-water developments have been installed on public and private lands to improve range utilization; about 5,000 acres of public and private rangelands have been seeded to grass; and complete range-management plans have been prepared on 60,000 acres of private lands.

A rangeland program is under consideration by the Vya board, coordinating the facilities of all Federal, State, and local agencies in preparing a complete conservation program for the district's public and private lands.

Lewis Cockrell, Vya district board chairman, and ranch operator in both States, expresses the opinion of himself and fellow ranchers this way: "Every acre of my lands that are capable of producing more feed will be improved eventually. My newly completed irrigation reservoir will allow me to double my hay production, and probably increase the selling weights of my yearlings



Chemical control of sagebrush like this is part of complete conservation range plan of 83-year-old Cattleman G. M. Warrens, one of Vya SCD's first cooperators.

and calves by 25 percent."

Jack Powers, another two-State operator, adds that "these rangelands must be managed for their full potential if we are to remain in the livestock business," which comprises the 100 percent economy of the area.

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U.S. exports of animals and animal products totaled $600 million in 1960-61.

Machinery Dealer Finds SCD Brings More Business—Better Community Life

By Harry W. Archer

WHEN some of our farmers got together 15 years ago to form a soil conservation district there were those of us who enjoyed a wink at the idea.

Well, we are not winking now!

We who were skeptics are firm in our support of the Lower Trinity Soil Conservation District.

Our board of district supervisors is made up of five of the best, most competent farmers I know. The board sets the policy for our district. The men of the Soil Conservation Service help carry it out. That adds up to a kind of teamwork that gets conservation done.

I am a dealer in farm machinery. When the farmers at first could not see their way clear to buy the new machinery they needed in conservation work, the board took action. The district bought the machines and rented them to the farmers.

In time, some of the farmers decided it would be feasible to buy machines of their own. Some have traded these earlier models recently on later equipment, which do a faster and more thorough job.

So, it is easy to understand my interest. But this interest goes far beyond the business of trading in machinery. I am interested in the conservation of our soil and water resources because I can see clearly their relation to the way my community can live. I see their importance for communities far in the future. My customers enjoy a more reliable income year after year. And they are better customers. It is good to see them prosper, even when you might expect them to be having a bad year or two.

We have alert farmers in our district. They were quick to see the advantage of improved pastures. They saw the need for a better seed supply. Our district is now the biggest producer of quality Louisiana S-1 clover and Gulf ryegrass seed.

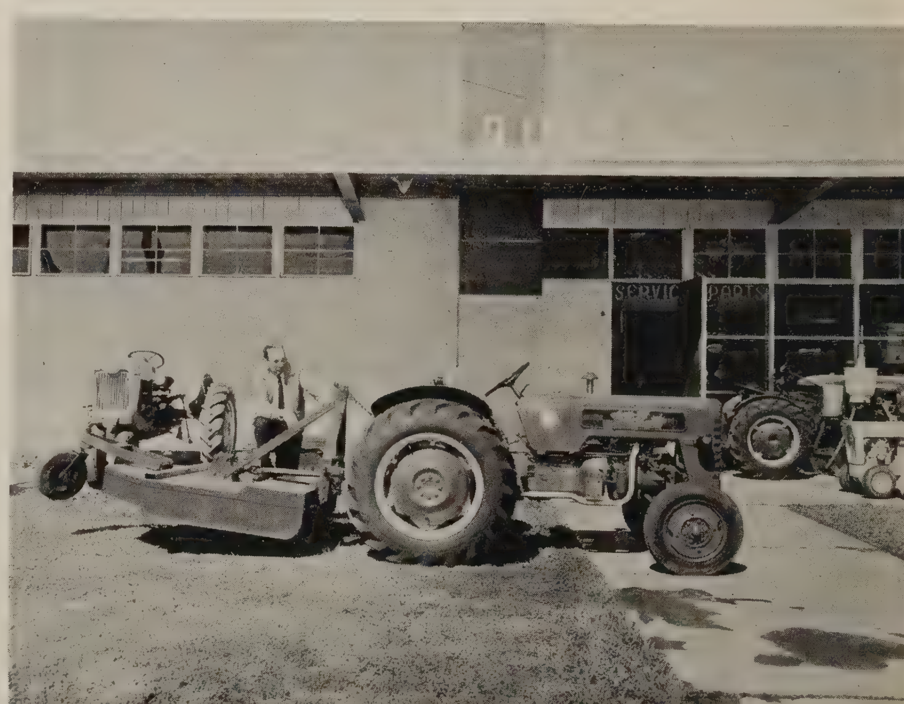
We have the most modern seed cleaning and processing plants. One firm ships quality seed to all parts of the world, and another ships certified ryegrass seed everywhere.

This all means that I sell more tractors, mowers, combines, fertilizer distributors, and countless other equipment to our farmers. Our tractor "population" is at an all-time high. Our service department and parts windows do a good business. We can keep a better stock of parts on hand. Our skilled mechanics stay busy.

I like to quote from a booklet recently published by a machinery manufacturer I represent:

"It is a well-known and established fact that conservation farmers and ranchers generally have a higher income per acre and purchase more farm machinery than those not utilizing good soil and water conservation practices."

You can't argue against this fact. As more and more farmers find



Machinery Company Co-owner Harry Archer with one of his best sellers—a shredder.

Note:—The author is an implement company dealer, Liberty, Tex.

out the value of soil conservation practices from their soil conservation districts, we sell more machinery. It takes machinery to put these practices into operation and keep them going.

With sales and maintenance going up, we keep ahead of our operating expenses as a dealership. This is our salvation with times as they are.

Our used machinery we rent to the smaller cooperators who can't afford to own it yet. We do this on either a cash or share basis. It is a good source of income for us.

Sure, I am sold on the work of our soil conservation district. Why shouldn't I be? I see three blades of quality grass where one grew before. I see two ears of corn where there used to be one. I used to see cattle grazing poor quality grass up to their bellies, although you could count every rib. Now there are twice as many cattle, sleek and fat, grazing good grass on the same land.

This sort of thing didn't just happen. It is the fitting together of a lot of farmer experience and scientific know-how into the skills of trained men and channeled to the land through this farmer-managed subdivision of our State government.

Up and down our streets, I see the reflection of this thing that has happened to our land. Our merchants, our banks, our schools and churches—all these reflect this new vigor that came to our land.

You can understand why I am a booster of our soil conservation district. I am first, I think, a citizen who believes in doing the best job he can at conserving our soil and water resources. Next, I am a businessman, convinced that soil conservation is important for every man, woman, and child, no matter where he or she may live.

And, as a businessman, I hold that the work of my soil conservation district is everybody's business. We can't afford to look at it any other way.

REVIEW

THE PLANT COMMUNITY. By Herbert C. Hanson and Ethan D. Churchill. xii-218 pp. Illus. 1961. Reinhold Publishing Corporation: New York.

Many workers and students concerned with soil and water conservation will be drawn to this book simply because it deals with "plant communities." The title, striking format, and sharp illustrations will further excite their interest. To what degree the book will satisfy such interest will depend, partly, upon the reader's background and ability to cope with ecological terminology.

To quote the authors: "This book is intended as a text for semester or quarter courses in plant ecology; as a supplement to textbooks in general ecology which usually do not deal adequately with the formation and nature of the plant community; or as an adjunctive text for courses in animal ecology, forestry, range management, wildlife management, conservation, and agriculture. It is also intended to serve the general reader who desires to be better informed about the nature of vegetation and its potentialities."

To the student with sufficient background in botany, soils, chemistry, genetics, and other basic sciences, the book will serve as a useful, comprehensive outline for the study of plant communities as basic ecological units. To the general reader, the book may be somewhat complex unless he makes use of its excellent bibliography as a means of expanding the discussions of some of the principles mentioned.

The book is divided into four parts and six chapters. Part one covers Species and Populations and covers chapters on Ecological Characteristics of Species and Populations, and Grouping of Species. Part two deals with The Community, with chapters on Analytic Characteristics of the Community and Synthetic Characteristics of the Community. Part three, Dynamics of Communities, includes only one chapter, on Habitat Patterns, Changes, and Climax; and Part four—Classification of Communities—also consists of one chapter, Bases and Units. General references are listed after five of the six chapters.

The text is well supplemented by illustrations and tables, with a bibliography of cited references and index completing the book.

Although simpler terminolgy would attract more readers, "The Plant Community" is a valuable contribution to an understanding of this subject.

—Robert E. Williams

◆

Canada is testing a new tree-planting technique that uses a planting gun and "bullets" to shoot seedling into the ground. Tree seeds are sown and germinated individually in the bullets fired from the automatic gun. On level ground, rate of 1,500 seedlings an hour was attained at a spacing of 8 feet. Although in the preliminary stage, the system soon will be refined to allow for large-scale use.

◆

Univerity of Illinois Extension Forester Ted Curtin reports that many Christmas tree growers are spraying their trees so they won't discolor. The color won't wash off, and pines will retain their needles. Spraying standing trees before color changes or freezing weather and poor drying conditions set in requires much less material than later spraying.

◆

Good seed is essential to a good harvest.

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TRAPPING SEASON AGAIN

Farm boys following the traditional wintertime pattern of earning spending money and their elders who make a business of trapping are getting better hauls these days from wet lands, farm ponds, and other water furbearers' habitat preserved or developed in soil conservation districts and small-watershed projects. Muskrats have become a particularly dependable fur crop in different parts of the country, as witnessed by this New Jersey catch: *Above*:—Frank Shimp in the Silver Lake-Locust Island watershed project and Salem-Cumberland SCD in Salem County hangs up his catch for the morning. *Right*:—His daughter-in-law, Ethel, hangs the green pelts to dry for 2 weeks.

Have You Seen?---

• *Conservation on Farm Woodlands,* published by U. S. Department of Agriculture as PA 463, by T. B. Plair, Soil Conservation Service. It discusses growing wood crops as a farm job and explains the place of woodlands in a conservation farm plan.

• *Water Conservation in Irrigation Agriculture,* published as SCS-TP-141 by the Soil Conservation Service. It calls attention to the growing demand for water and describes how conservation irrigation and water-supply forcasts aid irrigation efficiency and community and watershed planning.

• *Land-Capability Classification,* released by the U. S. Department of Agriculture as Agricultural Handbook 210, by A. A. Klingebiel and P. H. Montgomery, Soil Conservation Service. It explains the assumptions behind the classification and gives criteria for placing soils in capability units, subclasses, and classes.

JANUARY 1962

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

Soil Conservation

25 Years Ago

"Winter is a good time for farmers inside and outside the 153 erosion-control demonstration projects to think about pasture improvement and range management."

•

"Projects are eager to demonstrate to the farmer how he may conserve his soil at least expense. In every region short-cuts and cost-reductions are being effected through intelligent planning, through the substitution of vegetation for elaborate structures wherever feasible, through the adaptation of equipment already at hand, and through making use of the information accruing from both operations and research."

•

"Contour ridges may be constructed by the farmer with rapidity and at moderate cost, as compared with some other methods of protection. On an average slope, not severely gullied, a farmer with one team can mark and construct ridges on 2 acres per day."

COVER PICTURE—An example of the best of rural America—Monroe County, Wis.

VOL. XXVII, No. 6 JANUARY 1962

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Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

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FRANK B. HARPER, Editor

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Rural Areas Development

Through Soil and Water Conservation

By Donald Williams

SOIL and water conservation and rural area improvement have been synonymous concepts for almost 30 years.

From earliest erosion control demonstration and Civilian Conservation Corps project days in the 1930's, a main objective of the Soil Conservation Service has been to encourage the maximum number of landowners and operators in a given community or watershed to adopt conservation practices, not just for the sake of soil erosion control on their individual farms or ranches, but for area-wide resource conservation and economic betterment.

When farmer-organized and farmer-managed soil conservation districts took over leadership at the local level of the national action program of soil and water conservation, beginning in 1937, the communitywide conservation approach became a spontaneous reality. The objective of each district program is to conserve and develop all of the soil, water, plant, and human resources of the area so as to achieve economic and social benefits for the area as a whole—not just for individual program participants. The success of this community conservation approach has been repeated 2,900 times over in the soil and water conservation districts that today cover 92½ percent of the Nation's farmlands.

The practicability of rural area development through soil and water conservation next was demonstrated in small-watershed flood prevention and watershed protection projects.

In them, every pertinent aspect of rural area development, and related urban benefits, is taken into consideration. Thus multiple-purpose flood prevention dams may impound water that invites various agricultural processing plants and small manufacturing industries to establish themselves in the communities, while landowners and operators reap a continuing harvest of stable markets replacing the erstwhile unpredictable outlets for their agricultural investments and labor.

By the same token, the Great Plains Conservation Program in the 10-State area, reaching from Canada into Texas, is building rural area improvement on a scale never before experienced since the pioneers pushed their way into this vast and fertile region.

Every rural area's economy and well-being is rooted in the soil. So is that of every village, town, and city. There is not a single thing that the Soil Conservation Service does—from its cooperative soil surveys to its help to soil conservation districts and watershed farmers and ranchers in conservation farm and ranch planning and application of practices on their lands—that does not contribute directly to rural area improvement—the development of rural America! The SCS:

Gives technical assistance for economic development of soil and water resources for agricultural and nonagricultural purposes.

Provides soil surveys, land inventories, and land capability interpretations for agricultural development, site locations for project construction, special land uses, and public facilities.

Provides financial and technical assistance for developing water resources in small watersheds, for both agricultural and nonagricultural uses and for flood prevention.

With other U. S. Department of Agriculture agencies, assists farmers with farm unit reorganization and farm income improvement through replanning of farm units.

Contributes financial and technical assistance to long-range conservation plans on farms and ranches in the Great Plains area.

All of the work of the Soil Conservation Service contributes to the development and efficient use of land and water resources, and thus contributes to the basic objectives of the Rural Areas Development Program. The very nature of the Service's work, and the manner in which it carries it out through locally organized soil and water conservation districts, community watersheds, and Great Plains Conservation Program participants, among others, is basic to the RAD program. Any necessary reorientation and redirection to help rural areas plan and execute programs for expanded employment and income through intensified soil and water conservation farming will continue to be given priority Soil Conservation Service attention wherever the Rural Areas Development Program is undertaken.

Rural Area Development

At Its Best in Virginia

By Lester Fox

THE story of the Mountain Run watershed project at historic Culpeper in Virginia is one of rural area development at its best.

Everybody is sharing the benefits from this representative multiple-purpose small-watershed project in this historic Civil War battlefield area in northern Virginia, farmers across whose lands battles of a century ago were fought as well as the people of the town of Culpeper and of Culpeper County as a whole. They are enjoying these flood prevention, improved water supply, and other physical and economic benefits because rural and city leaders enlisted all-out community teamwork in seeing the project through to successful completion.

As Secretary of Agriculture Orville L. Freeman said in dedicating the project last September 23, it "shows plainly what local people working in tandem with the Department of Agriculture can accomplish."

"It is one means through which the rural areas of the Nation can begin to share more equitably in the prosperity of a strong and powerful Nation," he added. "And it is a means by which rural America can contribute more effectively to the continued growth and prosperity of that Nation. The people of Culpeper have shown that the program can be successful. We shall now move ahead to show the Nation that Rural Area Development can help people help themselves."

The people of Culpeper for years had been up against costly flooding and water-shortage problems. Flood damages amounted to $12,000 a year. In 1955, 1956, and 1957 Mountain Run, the town's main source of water, got so low it had to draw on its emergency supply from an abandoned quarry acquired several years earlier for storing standby water pumped into it each spring.

Secretary of Agriculture Orville L. Freeman dedicates Mountain Run watershed project.

New Plants:—Part of industrial and business expansion resulting from Mountain Run project.

Realizing that water troubles were pinching off Culpeper's chances for community and industrial growth, to say nothing of flooding and erosion damage to area farmlands, the Culpeper town councilmen voted to co-sponsor the Mountain Run watershed project with the Culpeper Soil Conservation District. Application for Federal help through the Watershed Protection and Flood Prevention Act was made in 1955.

The project received approval for Federal planning assistance the same year, and was authorized for construction in 1958. Work was started later that year on the first of three flood-prevention dams that, with 6½ miles of stream-channel improvement and conservation treatment of watershed lands, comprise the project's principal developments. One of the

dams was made a dual-purpose structure to store 190,500,000 gallons of water as an extra supply for Culpeper, or more than half a year's supply at the present rate of consumption. The other two dams are wholly for flood prevention.

The entire Mountain Run watershed project cost $545,000, of which $377,000 was the local share and only $168,000 the Federal Government's share, primarily for the flood-prevention part of the project. For every dollar spent on the project, a return of $1.18 in benefits is being realized. Here are some of those benefits in communitywide rural area improvement:

Because of plentiful water and protection from flooding, things are looking up in the Culpeper area. Three new industries have set up branches there, and others have sought information about possible sites. Without the watershed development, there would be none—nor the new jobs now open to several hundred local people.

Culpeper also now has a new hospital, the building of which likewise had been held up because of lack of water. And new home developments, made possible by the extension of water mains, are going up, along with a shopping center on a previously swampy area.

The town of Culpeper has eliminated most of its flood hazards; and once-hazardous flood plains are being converted to higher value uses for farming and commerce, broadening the community's tax base in the process. Roads in the watershed have been protected and beautified by roadbank erosion control measures.

The entire trading and residential area has been enhanced by the three new lakes, with total maximum flood pool storage capacity of 2,860 acre-feet, and by the channel improvements. Recreational space has been multiplied for boating and fishing; and a 4-acre picnic area is being developed at Mountain Run Lake, the first park ever developed in Culpeper County.

While the town of Culpeper is enjoying these many benefits from the Mountain Run watershed project, perhaps the greatest gains will come to the area's agricultural land in reduced flood damages. Protection and improvement of the farmland through stepped-up application of conservation measures makes possible more intensive and profitable use of that land and increases farm values.

These and other returns from the Mountain Run project explain why it was selected over all other watershed developments in the country to receive the National Watershed Congress' "Watershed Project of the Year" award for 1961. Meanwhile, the people of the Culpeper area are happy over their bargain of so many substantial returns for their investment, and the low cost of only $1,160 a year to maintain and operate the project.

New Hospital:—Water developed in watershed project made it possible.


New Homes:—Extra water made them possible, too.


New Lake:—SCS WUC L. B. Henretty has reason to admire dual-purpose lake supplying Culpeper's new water.

Note:—The author is field information specialist, Soil Conservation Service, Upper Darby, Pa.

Nation's First Small-Watershed Project Spurs Arizona Area's Economy

By Julian J. Turner

THE Nation's first small-watershed project to be completed continues to pay individual and community dividends in increased income and expanded business and public improvements.

It is the White Tanks pilot watershed protection project in Maricopa County, Ariz. Two flood-retarding dams were built in 1954 through the pilot flood-prevention program; and 9-mile-long McMicken Dam was finished in 1956 by the Corps of Army Engineers to control flooding on the Trilby Wash portion of the watershed. Together, they made reality the dream of local leaders as early as the 1920's and 1930's of protecting the fertile, newly irrigated desert lands, and the growing communities lying between the usually dry Agua Fria River and the White Tank, Wickenburg, and Hieroglyphic Mountains to the west and north.

For a quarter of a century, the Agua Fria story was basically one of local leaders with vision, determination, and a deep sense of community responsibility working together and with all available agencies of Government to solve their watershed problems of land management, soil and moisture conservation, and flood prevention. It included their enlisting the cooperation of the Soil Conservation Service in demonstrations in the early 1940's, before World War II slowed them down, and organization of the Agua Fria Soil Conservation District in 1945.

Note:—The author is State conservation engineer, Soil Conservation Service, Phoenix, Ariz.

The story also included preparation of detailed flood-prevention plans after World War II, based on a preliminary engineering report prepared by SCS in 1941; and agreement of the Maricopa County Municipal Water Conservation District No. 1, an irrigation district comprising about one-half of the irrigated lands of the soil conservation district, to lend the Agua Fria district equipment for clearing brush and digging test pits and to contribute other services.

Efforts were spurred by frequent damaging flash floods from heavy rains on the sparsely vegetated desert watershed, culminated in August 1951 when direct flood damage from a single storm amounted to $3 million. Rich farmlands and ripening crops were washed away, miles of highways and many sections of railroad tracks were washed out, and telephone lines were swept away. Luke Air Force Base and roads leading to it were inundated. Training of combat pilots vitally needed in Korea was suspended for several days. Homes of people living on farms in the town of Litchfield Park, Goodyear, and Avondale were damaged severely. The aircraft plant and the Litchfield Naval Air Facility were under water.

With $34,000 of 1952 Production and Marketing Administration funds and $108,000 contributed by the irrigation district, and with SCS technical direction, a dam 4 miles long and 23 feet high was built that effectively controlled all nine subsequent floods

One of White Tanks dams with protected irrigated land (upper left).

in the Trilby Wash area, and is now a part of the 9-mile-long McMicken Dam.

But the big break came in 1953 when Congress appropriated money to carry on flood-prevention and watershed-protection work in more than half a hundred selected tributary watersheds over the country, one of which was the White Tanks "pilot" watershed project. Meanwhile, Arizona's Senator Carl Hayden sponsored legislation authorizing the Secretary of the Air Force to construct the Trilby Wash detention basin and outlet channel, later dedicated as McMicken Dam.

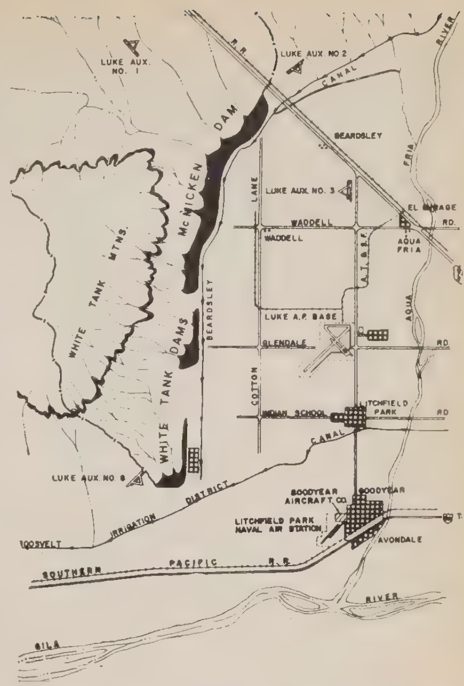
Thanks to the long range planning of the SCD supervisors and irrigation district officials, rights-of-way had been arranged for, water rights settled, and detailed plans were ready for the White Tanks project. A contract for construction was awarded early in 1954, and by July of the same year, the White Tanks work was completed, at a cost of $420,000, of which the local interests contributed $220,000 and the Federal Government $200,000.

It was because damage to defense installations was caused by floodwaters from Trilby Wash that the County of Maricopa as sponsor for both projects called upon the Corps of Engineers for help in the control of that portion of the watershed, for which local interests contributed another $250,000.

The White Tanks and McMicken Dams have had a tremendous effect on rural development and triggered a boom in the application of conservation practices and communitywide improvements of all kinds:

SCD cooperators replaced 233 miles of wasteful earth ditches with concrete-lined ditches or pipelines during the 5 years after completion of the White Tanks project—121 miles more than were installed during the 5 years prior to 1954. District farmers have lined or tiled more than 400 miles of irrigation ditches and precisely leveled more than 52,000 acres of the 70,000 acres of farmland. These measures, plus more efficient use of irrigation water, are credited with preventing water loss and waste of more than 40,000 acre-feet annually, or enough water to produce 8,000 carloads of lettuce.

With the protection of flood prevention, more farmers turned to such high-cost, high-income crops as lettuce, asparagus, and grapes. Their per-acre gross income rose from less than $200 to better than $400 between 1950 and 1960. The 36 miles of farm roads paved since 1954 is 10 miles more than all the roads previously paved. A million-dollar housing development has been built adjacent to one of the White Tanks dams. Census figures show that the towns of Goodyear and Avondale have more than doubled in population, and assessed valuation of property in these two incorporated towns tripled between 1950 and 1960.



White Tanks project area with protected farmlands, communities, and installations at right.

The multi-million dollar Phoenix Air Defense Center has been established at Luke Air Force Base, and the Capehart Housing Project of 1,000 homes has been built on land that was under water during the 1951 floods. Three thousand acres of fertile land, previously abandoned, has been reclaimed and is producing crops valued at more than $1 million a year.

This is a typical comment by those who are benefiting directly

Irrigating leveled field of fall lettuce from concrete-lined ditch.

Western Ave. and Litchfield Rd. during 1951 flood.

Same corner as developed in 1961.

from this watershed-rural area improvement:

Vice-President W. N. Kring of Goodyear Farms:

"Prior to the start of this program, our property had on several occasions suffered extensive damage from flash floods, having their origin in the White Tank Mountain Area. We feel that with the diversion and detention dams now in place, our property is, for the first time, adequately protected."

Teamwork Saves a Bridge

By Leon J. McDonald

THE taxpayers got a bargain when supervisors of the South Caddo County Soil Conservation District and County Commissioner George Nixon in Oklahoma teamed up to do a $30,000 bridge-saving job that neither could do alone.

Because drainage from 1,800 acres was diverted from its natural course to the bridge area, the bridge, built of reinforced concrete in 1948 as a part of a farm-to-market road project, was almost ready to fall into a huge gully and follow the soil down the creek. The concentration of runoff water was flowing through and under the bridge, and had created the gully by washing 30,000 cubic yards of soil from the area below the structure. The gully was so large that it was estimated it would have taken dump trucks hauling 30 loads a day for 5 days a week 40 weeks to refill it.

Commissioner Nixon went to the district for help. The supervisors told him the Soil Conservation Service technicians assigned to the district could help him. They helped him develop a plan, which included an 8-foot concrete drop from the base of the bridge, and a 5-foot apron which brought the bottom of the structure to base grade.

Doyle Dirickson, district cooperator and owner of adjacent land, granted the county a 100-foot right-of-way for one-half mile. The gully banks and all disturbed areas were sprigged to bermudagrass to prevent erosion and make the road safe for motorists.

Gully that threatened bridge.

Concrete drop and apron built to base grade.

The project cost $6,500 and the "will to work together."

Note:—The author is assistant State conservationist, Soil Conservation Service, Stillwater, Okla.

Big "C" Stands For

Connally—Cattle—and Coastal Bermudagrass

The Connally brothers (left to right) John, Wayne, and Merrill, with purebred Hereford bull.

By Harold V. Stephans and Fritz Graeber

SOMETHING of an ''agricultural revolution'' was started in the area southeast of San Antonio when Manager Merrill Connally of Picosa Farms in Texas' Wilson County Soil Conservation District planted some tired peanut land to coastal bermudagrass in 1957.

The district, with headquarters at Floresville, has been noted for the production of peanuts and truck crops for many years. But a combination of wind and water erosion, rising costs of row-crop production, and falling prices caused many farmers to look for something that would give them better returns with less labor and investment, and which also would control soil erosion. Coastal bermudagrass has provided a solution to their problems.

In an area blessed by a long growing season, plenty of sunshine, and adequate moisture most of the time, coastal bermudagrass has thrived beyond their fondest dreams. Fields which were considered worn out have shown new life. Blowing sand has rolled to a stop. Raw gullies are being turned into gentle, productive watercourses.

Connally emphasizes that coastal bermudagrass can be profitable for broader community uses than individual ranch feeding. Several thousand bushels of sprigs have been sold to farmers to be used to establish pastures and grassed waterways, and to stabilize critical erosion areas. Coastal bermudagrass also has proved to be ideally suited for protecting dams and levees, as well as for desilting water above ponds and reservoirs.

A considerable amount of baled hay was sold to watermelon shippers to pad their melons en route to market. Hay brought $30 to $35 a ton in 1960. Ten tons of hay to the acre was harvested on part of the Connally acreage. Coastal bermuda also has been effective in weed control.

Ever since the beginning of this new grass-planting venture, Merrill, John, and Wayne Connally have been clearing brush from low-producing pastures, developing water facilities, fencing—and, of course, buying cattle. Whereas at least 12 to 15 acres was needed to graze 1 animal unit on brushy native pastures, 2 acres of dryland coastal bermudagrass normally will carry 1 animal unit for a period equivalent to 12 months. Merrill Connally thinks 1 acre, if irrigated and fertilized, will support 2 animal units

Connally registered Hereford cows and calves on coastal bermudagrass pasture.

Note:—The authors are management agronomist, Alice, Tex., and work unit conservationist, Floresville, Tex., both of the Soil Conservation Service.

for an equal time. He estimates that beef production will hit 250 pounds an acre on dryland coastal bermuda, and 1,000 pounds an acre when irrigated.

The Connally brothers have a basic herd of 100 registered Hereford cows, and belong to the Texas Hereford Association. They also have 150 head of high-grade commercial cows, and 250 head of average commercial cows. Approximately 65 head of Santa Gertrudis cows are grazed on one division. Their goal is to run 1,000 head on 3,300 acres of coastal bermudagrass within the next 2 or 3 years.

Pasture-management practices in the conservation plan, which the Connallys worked out through the soil conservation district with the technical help of the Soil Conservation Service, include rotation grazing, proper pasture use, and fertilizing. Water facilities were planned at key locations, and irrigation practices on 400 acres.

Pasture units consist of 50 to 60 acres of coastal bermudagrass, which is grazed down to approximately a 6-inch height before cattle are moved on to a fresh pasture. This practice permits timely harvest of high quality forage at the proper stage of growth. When the grass gets ahead of the cattle, hay is baled. The hay is fed during winter or sold to local beef or dairy farmers, who are anxious to buy this quality feed. Coastal bermudagrass ensilage also has been used successfully.

Fertilizing is of prime importance in increasing growth and quality of forage. A bonus of 8 percent protein is included in fertilized forage over the unfertilized. Tests show the protein content of forage from fertilized coastal bermuda to be approximately 16 percent on a dry-weight basis.

The Connallys are setting the pace in a trend to grassland farming in south-central Texas. The outlook is good for the area's economy for the land, and for those who make their living from it.

Project Solves Water Problems For Illinois City and Farmers

By Kent Alverson

A FARM-CITY "conservation package" deal has put an end to the long-standing water worries of the people of the Pittsfield area in west-central Illinois for at least the next 75 years.

As a result of their recently completed watershed protection and flood prevention project on Big Blue Creek, they now have a 240-acre lake and a spanking new treatment plant that will send pure water to local homes and industries. The lake is Lake Pittsfield, but the dam is dedicated to Tom Troutner, former mayor who got the project started.

The lake stores water for community use and to reduce flooding of farmland in the Big Blue watershed—a broken, secluded farming area lying between the city and the Illinois River. The same dam that backs up water for Pittsfield's lake has extra height to catch and store temporarily the excess water that pours off 10,000 acres of surrounding farmland during heavy rains. This dam, and a smaller one farther upstream built just for flood retardation, will provide 2,800 acre-feet of temporary storage.

Slowing this water down will cut flood damage on 830 acres of highly productive flood-plain land below. Soil Conservation Service economists figure farm benefits will be at least $8,000 a year and city benefits more than $10,000 a year. Returns will be about $1.25 for every dollar spent, not including those from recreational facilities, attraction of new industry, or lower fire insurance rates.

This is truly a local project, with Federal help. In planning ahead for future water needs, alert city officials not only had saved enough to buy the necessary land outright, but they will finance all other costs through regular receipts without

Conservation land treatment will prevent erosion like this from silting up the new lake.

Note:—The author is field information specialist, Soil Conservation Service, Milwaukee, Wis.

additional tax burdens. In a report to the community at the dedication ceremonies last Octoer, Mayor Frank Penstone listed local cash payments at $168,848; general obligation bonds $458,000; revenue bonds $175,000; and $114,,269 received from the SCS for defraying the cost of the project's flood-prevention features.

To keep their lake clear and beautiful, sponsors are counting heavily on farmers in the watershed to follow such conservation practices as cropping systems with plenty of grasses and legumes, and contour cultivation to keep topsoil on their fields and out of Blue Creek and the lake. More than half of the landowners above the two dam sites are cooperators with the Pike County Soil Conservation District, and the number is increasing.

The Pittsfield area has a long history of severe water shortages. In the drought years of 1953 and 1954, for example, Pittsfield hauled water from the Mississippi River at Louisiana, Mo.; and $30 a month for a family water bill was not unusual. By 1946, the city's primary source of water, a small reservoir built in 1924, had lost nearly half its capacity from silt washed down from surrounding cornfields farmed up and down hill. Even after the drilling of two deep wells to supplement the lake, the supply barely kept pace with the city's increasing water consumption.

After the Watershed Protection and Flood Prevention Act was amended in 1956 to permit inclusion of locally financed municipal water-supply structures as an integral part of a watershed project, application for help under the act was made in July 1958. The Pike County district and the city were sponsors of the project, with 12 endorsing local organizations. The structures were completed in 1961, and watershed land treatment is expected to be finished in 1962.

Here are some things Pittsfield did to make its dream of an adequate water supply come true:

Pittsfield's new lake with treatment plant at lower left.

Bought the structure sites and an additional several hundred acres around the lake, and embarked on a grass-seeding and tree-planting program on this land; built a road to the structure areas and removed timber from the lake site; hired a professional engineer to draw up plans for the lake structure and supplied extra help for survey and drilling crews of the Soil Conservation Service; and, through its city council, carried on a compaign to give the people of the area a full report on developments.

Meanwhile, Wendell Orr, 1959 chairman of the soil conservation district board, worked with the city and farmers in getting easements and rights-of-way; and the U. S. Forest Service and State Forestry Department, the SCS and the Extension Service cooperated on tree planting and woodland-improvement practices, and in getting better farming practices established on the watershed.

No one yet knows all the community and area benefits that may come out of this project. Mayor Penstone has set up a planning committee to preserve the beautiful shoreline of the lake, guide the layout of building sites, and deal with other problems or opportunities. In the meantime, farmers and townspeople of the Pittsfield area are enjoying better crops, freedom from floods, and such new-found recreational pursuits as fishing, boating, and picnicking that are resulting from their water development on the Big Blue.

Conservation Leader Looks at RAD

In 1959, more than 75 percent of all farm families had incomes of less than $5,000. About 36 percent of all our farm families had incomes of less than $2,000. That year the amount of underemployment on farms was equivalent to 1.4 million man-years of unemployment.

It's not good enough to suggest that displaced or underemployed farm people go to the cities . . . .

The big need, obviously, is for more jobs in rural America. That's the goal of the Rural Areas Development Program—and it's also a giant opportunity for soil conservation districts.

—William E. Richards, Pres.
Natl. Assoc. SCD

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Rural Commun

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Agricultural Credit Director and Rural Areas Development Board Chairman John A. Baker.

RURAL Areas Development is establishing itself as a new and effective tool for strengthening community economic growth and improvement and thereby enabling rural America to contribute its full share to national economic strength and security.

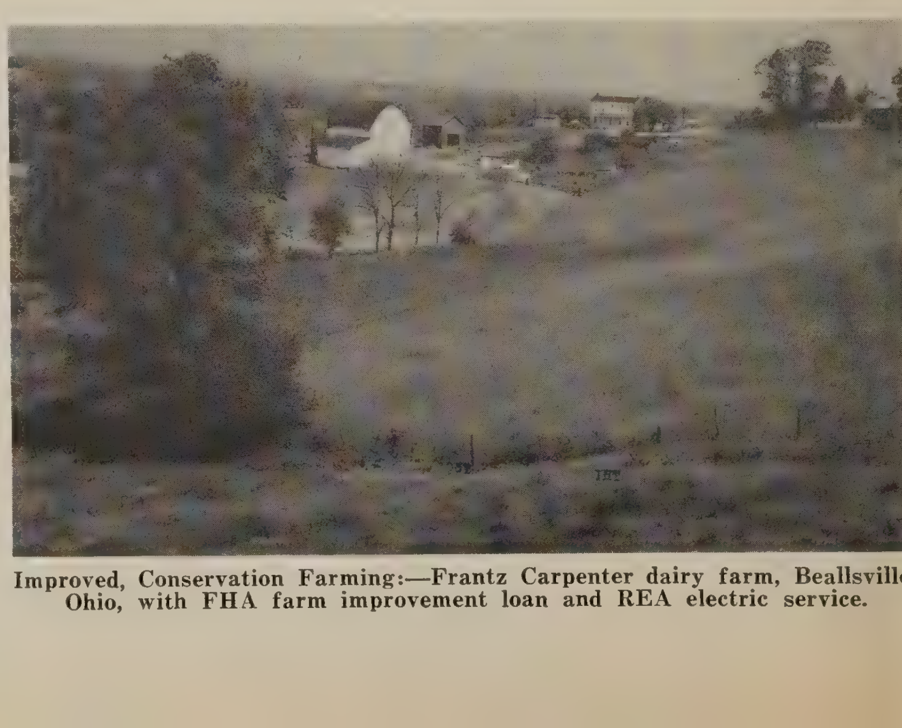
Rural areas development is not a separate new program or agency. It is a directed and reoriented new approach to all our work in the U.S. Department of Agriculture. It is a new concept of Government response to the aspirations of rural communities for development and growth—for program services that will stimulate their economies, both farm and industrial, both commercial and cultural, both human resources and natural.

Beneficial progress in the field of agriculture as elsewhere consists of bold, workable new ideas put to work. Farmers' and ranchers' local soil conservation districts and the Soil Conservation Service and other agencies of the Department whose technical and other services the districts depend upon have demonstrated the success of combining skillful physical and biological engineering with skillful social engineering. Rural areas development is another such bold, new idea being put to work with that same skillful combination.

The principles that have proved to be sound and effective in their application in soil conservation districts, small-watershed projects, and in the Great Plains Conservation Program are now being put to work on a Department-wide basis, to help build the economic and institutional, as well as conservation, foundation for permanent prosperity in rural America.

Rural areas development, like soil and water conservation, starts from, and is based on, the needs and desires of the rural community itself. The basic ingredients are initiative, imagination, drive, and cooperation among local people and their organizations and leaders, making effective use of available services, including those provided by the Federal Government. It is the same combination that has spelled success in soil conservation districts.

More rapid economic development of rural America will require new businesses and new industries, watershed development, additional small factories, improved facilities for outdoor recreation, new farm crops, flood prevention, improved health facilities, more adequate and more prosperous family farms with sound long-range soil, water, and management plans, new tourist attractions, and the more than



Improved, Conservation Farming:—Frantz Carpenter dairy farm, Beallsville, Ohio, with FHA farm improvement loan and REA electric service.

Tool For Improvement

aker

101 other things that are needed to expand economic opportunities and build better rural communities.

Through the rural areas development approach, the Department seeks to adapt and shape the programs of all its agencies to be of greatest possible usefulness to local rural areas to meet their current needs in ways that people in the areas hope to meet them. All the agencies of the Department are taking part in one way or another in rural areas development. We operate under a broad framework of legislation that provides a great many tools that the people of a community can use to develop the resources and opportunities of their areas.

This is a broad, nationwide effort to focus all of our local, State, and Federal resources so as to encourage and promote community improvement and enterprise stimulation in the entire countryside and all the villages, towns, and small cities of rural America all over the Nation. Every rural county in the United States is eligible for special attention. Counties of each trade or market area are going together to formulate and carry out an area development and improvement program.

Taking the new areas development approach, rural communities can begin to dream for an optimistic future. Secretary Orville L. Freeman has committed USDA efforts to help them to make those dreams come true. American democracy was founded on the rural frontier—guided and shaped by it. American democracy can still fulfill the pioneers' dreams in the rural areas where it was founded.

Our goal is to sustain a more rapid rate of economic growth and community improvement throughout rural America—a rate rapid enough to take up the slack of an equivalent of 2 million full-time unemployed, plus the more than 12 million youth who will come to working age in rural America and will be looking for jobs over the next 15 years. This is not a simple problem. Rural communities will need to put out all the effort, all the energy, and all the drive and vision they have in order to succeed. They want and need to organize for a sustained effort. But to succeed, the initiative and the policy decisions must be those of private rural citizens.

To maintain the non-Federal character of rural area development organization and policy making, State Extension Services (rather than straight line Federal agencies) were invited to take the lead in helping local leaders to organize State, area, and county programing committees. They are composed of broadly representative leaders of all the private, State, and local groups and agencies properly interested in rural community improvement—all who seek to root out all the complex causes of rural poverty and rural disparity.

Most States already have active rural areas development committees. In all of them, the State soil

Community Industries:—This Saltello, Tenn., shirt plant employs 170 people.

New Schools:—Old River High School at Hannibal, Ohio, was sold as an industrial site.

conservation district committtees, commissions, or boards and the district associations are providing leaders for committee membership with special soil and water conservation and development know-how.

State rural areas development committees are setting up similarly broadly representative area and county committees of private local citizens. The major significant work of area program formulation and implementation will, must, and should be done by these area citizens' committees.

Federal specialists will be "on

Note:—The author is director, Agricultural Credit, and chairman of the Rural Areas Development Board, U. S. Department of Agriculture, Washington, D. C.

tap but not on top" in area program development. Federal employees of USDA and other agencies, where appropriate, have been organized into State technical panels. The Farmers Home Administration State director serves as chairman of the State USDA technical panel. The SCS State conservationist is a key member. Agencies represented on the panel are supplying technical help to the lay citizens' committees in carrying out or backstopping rural area development programs.

Similar USDA technical panels are being set up to provide professional aids to area and county committees. The relationship of a State, area, or county rural areas development committee to its technical panel is expected to be comparable to that of a soil conservation district governing body to the SCS work unit staff.

Continuous group attention to a living overall development program by broadly representative area leaders is the key to more rapid economic growth and rural community improvement. A living, meaningful area development program, like a good long-range farm or watershed plan, must be constantly renewed and improved. This requires continuous analysis of a fairly detailed knowledge of area resources, such as farm production facilities, manpower, timber stands, etc., and of such problems as extensive poverty on too-small farms, lack of training opportunities, and large numbers of people beyond the work age. Developing such a program requires a hard-headed, business-like evaluation of area potentials and limitations. It consists of a long-range agenda for progress and a list of priority projects, with specifications on how they are to be carried out successfully.

Let me give you an example of how all the elements of area development—farmland, water resources, manpower, industry—have a way of fitting together:

A few years ago, a big plant opened in a rural southern Ohio county with a majority of small, low-production farms. Many of the farmers found work helping build the plant, and permanent work in the plant upon its completion. This development offered an opportunity for some of the full-time farmers to buy or rent land from their neighbors, not only to make up economic units but, just as important, to maintain conservation practices on what had been idle, often neglected land.

Nothing the Department of Agriculture is doing puts this idea into practice better than the Small-Watershed Program. In one area after another where such a program has been developed, the entire economy has been given a shot in the arm. Culpeper, Va.; Six-Mile Creek Area, Ark.; Stephens County, Okla.—the list is long. Hopefully, it will be longer.

A small-watershed project often catalyzes the whole rural development complex. Family farm improvement, soil and water conservation, water resources control, industrial development, commercial expansion, improvement of community facilities, and recreation—they all fit together, like a well planned, well made building. Conservation supports improved farming and protects basic farm resources. Industrial development in turn makes possible better use of farm resources, and brings more capital and more income into the area to pay for other needed long-term improvements.

That is rural areas development at work!

More Recreational Facilities:—Dumas Lake area developed by Tippah County, Miss., community clubs through rural development program.

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Soil surveys and other information furnished by the Soil Conservation Service provide the basis for farm records being used in a study of reasons for variation in farm income on wheat-pea farms in northern Idaho. Researchers of the University of Idaho are using these records to study the effect of changes in farm size, in crop rotations, and in the amount of commercial fertilizer used.

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The National Association of Soil Conservation Districts will hold its 16th annual meeting in Philadelphia, Pa., at the Sheraton Hotel February 4-9, 1962.

Arkansas Watershed Project

Boosts 2-County Area Economy

By Hollis Williams

Seamstress in hosiery plant is one of 400 workers employed by new industries.

NEW industries and improved municipal water supply are among numerous tangible evidences in Arkansas' Six-Mile Creek watershed that small-watershed projects are effective in bringing about successful rural area development.

Six-Mile Creek was selected for a pilot watershed-protection and flood-prevention project in the fall of 1953, and work was essentially completed in 1959, with Soil Conservation Service engineering and other help. In addition to 24 flood-detention structures, the work included 28 miles of stream-channel improvement, and land-treatment measures on the major part of the 164,627-acre watershed.

Of the 1,111 farm units in the watershed, 1,056, comprising 138,830 acres, are operated by farmers cooperating with the sponsoring Franklin County and Magazine (Logan County) Soil Conservation Districts. Ninety-seven percent of their planned conservation treatment has been applied.

Three new industries have come into the watershed area since the project was established in the fall of 1953. Each of them depends upon water from one or more of the flood-detention structures for its present needs or future development. In fact, the first industry, a comb plant, was about to pass up a proposed location at Booneville, because of inadequate water for later expansion; but when the local people made arrangements for use of water from two of the flood-prevention structures, the plant was built.

A short time later, the same company set up another new industry, for manufacturing bowling balls. Next, a hosiery company opened a plant, arranging for water from another flood-detention structure.

These 3 companies employ more than 400 local people and have combined payrolls of more than $1 million a year. They have given a big boost to the economy of the surrounding area, from which they draw their labor supply. Principal towns in the area are Paris, population 3,000; Booneville 2,700; and Charleston 1,200.

"The watershed project has created very favorable conditions for rural development," says John Lachowsky, Logan County supervisor of the Farmers Home Administration, the agency which, with the Rural Electrification Administration and Extension Service, has the job of helping local groups get under way in the Rural

Note:—The author is assistant administrator for watersheds, Washington, D.C., and former Arkansas State conservationist, Soil Conservation Service.

One of three plants attracted to Six-Mile Creek watershed by ample water supplies.

Areas Development Program. "You'd be suprised at the building improvement, new housing, dairy barns, poultry houses, and improved pastures that have been developed since the watershed program started."

Jeff High, assistant county supervisor, reported that FHA was closing a $13,000 farm home loan which it was able to make "because the watershed program put a lot of bermudagrass on the land." This farm, he explained, had extensive flood-plain land on both sides of Six-Mile Creek; but before the flood-prevention structures were built, this bottom land was virtually worthless, because of frequent flooding. Now, protected against floods and planted to improved pasture, it is valuable land that provides ample security for the loan.

Logan County Agent Morris O'Quinn pointed out that, "We have shown that a watershed program can supply the water needed for industrial development. And you've got to have water before you can get industry interested in any location."

The Six-Mile Creek project soon will be providing supplemental water for Charleston's municipal water system. Charleston is spending $26,000 to raise the dam and spillway of one of the flood-prevention structures to provide an additional 84 million gallons of water a year. The resulting total of 134 million gallons will meet the town's estimated needs until 1990.

President Clyde Hiatt of the American State Bank at Charleston explains that one reason for supplementing the water supply is the tremendous amount of water used by a cannery there. The cannery provides a market for produce from a wide area, and employs 40 to 50 local people. Thus watershed development will be an important factor in the continued successful operation of this fourth plant.

Another benefit of the flood-prevention structures showed up early, when the Arkansas River at Little Rock dropped to its lowest point in history on September 12, 1956. Tributary streams like Six-Mile Creek long since had ceased to flow; but several hundred million gallons of water was available for emergency use in the 21 reservoirs that had been completed. For example, landowners along Little Caney Creek, a tributary of Six-Mile Creek, were able to get livestock water from an upstream reservoir when its drain was opened for 24 hours and Little Caney began to flow again. All the low places in the creek were filled with fresh water, but the reservoir level was lowered only 3 inches.

Section of Six-Mile Creek in 1955 before channel improvement. (Note bridge upper left.)

Same stretch of the stream in 1957 after channel improvement.

Recreation is an important benefit of project's 24 flood-detention reservoirs.

All these benefits are incidental to the primary flood-prevention purpose of the Six-Mile Creek watershed project. A continuing study by the Agricultural Research Service since 1955 shows that reduction in flood and sediment damages has averaged nearly $45,000 a year. That includes years when only a small part of the protective measures had been installed, and when much of the bottom land had not been put to its best use and "damageable" value of the crops and pastures was not yet at its maximum.

Logan County Judge J. W. Cotton estimates that the project saves the county an average of 75 percent of the usual costs of road and

bridge maintenance within the watershed, with the money saved available for improving farm-to-market roads.

The effect the watershed program has had on farms with flood-plain land is illustrated on the 767-acre farm which Ed Ullrich manages for a milk company. Ullrich was born on the farm, which included land homesteaded by his father; but when his father died he had to sell the place, because he couldn't borrow enough money to buy out the other heirs. One reason was that the 400 acres of flood plain was considered virtually worthless, flooding 10 to 15 times from January to June during an average year. The land was so grown up in briars and sprouts that "a dog couldn't get through it," he said. Its loan value was nil.

"I've already cut 50 bales of hay to the acre on this field this year," Ullrich reported of his 1960 operations, which included harvesting a fall crop of grass silage from the same level flood-plain land. "I couldn't do anything with this land before the dams were built and the channel work was done. Now I've got all my barns full of hay and my pit full of silage.

"With the rain we've had this year, this valley would have been under water all the time. Before, we couldn't plow the land, because the sweeping wash of the floods would scour the soil away. We couldn't even let our cows run down here for fear of flash floods. But now, if I were looking for a livestock farm, I wouldn't know where to find a better one."

In addition to the sponsorship of the soil conservation districts, the watershed program has been backed or given help by chambers of commerce, commercial and civic clubs, county governments, highway departments, farm organizations, school officials, women's clubs, garden clubs, levee districts, public utilities, the Soil Conservation Service, Agricultural Stabilization and Conservation Service, the Forest Service, and other U. S. Department of Agriculture agencies, and by local industrial groups, city governments, newspapers, and radio and TV stations.

Small wonder that Six-Mile Creek was chosen "1960 Watershed of the Year" by the National Watershed Congress!

District Program Restores *Ghost Land* In Nevada Ghost Town Area

By D. J. Johnson

MANY localities in the West have "ghost land" as well as their better-known ghost-mining towns. But while ghost-town store fronts and shanties continue to crumble away, many of their lands are being restored to profitable livestock use through modern soil and water conservation district farm and ranching systems.

Take, for example, the Crystal Springs Ranch in Pahranagat Valley, a pioneer setting of ghost towns, close to one of Nevada's first gold strikes. There, under its enterprising owners, the eight Stewart brothers, the old Crystal Springs Ranch, dating back to frontier times, is getting the full good-land-use treatment and is becoming a new conservation showplace. In a little more than a year of planning and doing, some 700 acres of shabby bottom land has taken on a fresh, new, productive look. Hay yields already have doubled on 80 acres, and grazing on much of the revamped land soon will step up from 1 to 3 animal-unit months an acre.

Crystal Springs Ranch was broken out of desert land between 1853, when Hiko to the north became a bustling mining camp, and 1880, when Alamo was settled just to the south. Indians at one time grew their crops on the ranch site. The ranch has had seven owners since 1870, all livestockmen.

The ranchlands were run down and overused when the Stewarts bought the place in 1956. Thick stands of cottonwoods water-logged old ditchbanks. Alkali was so thick on bottom lands that it looked like a fresh snowfall. In 1957, the year the Stewarts took over, bottom land hay outputs were down to $1\frac{1}{2}$ tons an acre.

"We had some real tough soil and water problems to solve but didn't have the 'know how' to work them out," said Gilbert and Alden Stewart, as spokesmen for the brothers-eight. "One of our first moves before going ahead with

An abandoned (western) "ghost town" store.

Note:—The author is work unit conservationist, Soil Conservation Service, Caliente, Nev.

This is Crystal Spring, source of irrigation water for 2 ranches, which flows at the rate of 11 cu. ft. year-long.

our development plans was to talk things over with the supervisors of the Pahranagat Soil Conservation District early in February 1957.

"A technician from the Caliente office of the Soil Conservation Service, came out to our place, and we began working out the bottlenecks together. The first thing recommended was to lower our high water table and get rid of cottonwoods. Most of our bottom land needed leveling, too, so we could do a better job of irrigating. After much planning we got on with the ranch-revamping work."

This is the 1-year calendar of the Stewarts' successful efforts to restore their "ghost lands" to a modern, productive ranch unit:

February—Tractors and carryalls started leveling around 135 acres of rough land on two of the least waterlogged and tree-covered fields and shaped it for irrigation; and a bulldozer pulled out and windrowed trees and filled up ditches. Leveling costs averaged \$50 an acre.

April:—Borders and corrugations for better control of irrigation water were laid out. Fields were seeded to a mixture of alfalfa and long-summer growing alta fescue, smooth bromegrass, and orchardgrass adapted to this area. Fertilizing to control weeds was put off until the next year, when 200 pounds of treble phosphate and ammonium sulphate were applied.

June:—Work started on installing more than a mile of concrete-lined canal to carry spring water safely through bottom lands. It replaced 3 miles of old dirt ditching which crisscrossed and waterlogged the lands.

July:—The canal was completed, with five lateral ditch outlets, carrying a flow of 4,950 gallons of water a minute. The ditch cost the Stewarts about \$1.60 a linear foot. Early concrete-lined ditches in the valley were built by hand labor, but the Stewarts used a slip-form type of boat which pressed concrete lining into place as it was pulled along in the ditch. This machine work called for little hand labor.

Concrete-lined irrigation ditch in sandy area with high saline condition.

In operation, the canal did more than carry the spring water; it lowered the water table on most of the ranch so more land could be leveled and otherwise improved for better forage and livestock production.

December:—At a time when the water table normally is high, 4-foot holes were dug in drained fields without hitting water. The Stewarts started developing more of their ranch with three 21-cubic-yard, self-propelled carryalls, three dozers, and ditch-lining equipment.

February 1958:—A year after the start of the Stewarts' soil and water conservation work, 237 acres had been leveled for irrigation, and 9,874 feet of concrete-lined ditches were completed. Erosion-control dikes and dams had been installed to protect bottom lands from watershed runoff on desert range on the west side of the valley. Development work also included putting in fencing around the ranch boundaries, plus some cross-fencing, and building of a 1 acre-foot pond near ranch headquarters.

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Sundangrass makes a good, high protein silage.

Part of 23-acre leveled irrigated field that produced 5 tons of grass-alfalfa in 1959 as against almost none in 1957.

Only A Stone's Throw

To Rural Area Improvement

By Joseph Bornstein

FARMERS and summer cottagers in Vermont have hit upon a mutually beneficial solution to the problem of what to do with those pesky stone piles on hayfields and other farmlands.

Regardless of the ultimate findings as to whether rocks should or should not be picked from stony fields, those accumulated through past generations of stone picking pose a real problem for Vermont and other New England farmers trying to manage their lands efficiently and make the best use of their haying and other equipment.

One of them is J. A. ''Dolph'' Dewing in Franklin County. Eleven stone piles on the Dewing farm in East Franklin not only were in the way of his farm operations, but they also interfered with a proposed U. S. Department of Agriculture-University of Vermont drainage research project.

The Dewing farm, in the family since the 1830's, is a ''country mile'' south of Canada, on Lake Carmi. ''Dolph,'' as have many of his neighbors, has been picking stones off his fields and adding them to the ancestral rock piles for most of his farming life, every time a field is plowed. A stone pile, 25 to 40 feet in diameter, on every 5 acres is not uncommon in the area.

Loading stones on Dewing farm.

Dewing has been a Franklin County Soil Conservation District cooperator since 1953. Even in dry years he has hay to sell from his 172 acres, that feed 60 milkers and 10 to 15 head of young stock. The market for hay convinced him it would pay to improve his water-disposal system and go to an improved, long grass-legume mixture, with drainage lengthening the time between reseeding and helping increase hay yields. But it was not easy to fit an efficient drainage system between the assembled cobbles, or to maneuver equipment around piles of stone.

Plans were made to start moving the stones off the drainage research site in August 1959, but fall rains held up the job, though two cottage lot owners were looking for solid fill. In January 1960, Conservation Contractor Walter Benjamin of St. Albans came in with an idea to put his idle equipment to work.

He figured he could plow roads across Dewing's snow-covered field to let the ground freeze solid. There was only 6 inches of frost under the snow. Within three subzero nights after plowing, the trucks were able to roll right up to the stone piles. Using a bulldozer, a 3/8-yard track-mounted shovel, and two 5-yard trucks, his crew averaged a stone pile every 10 hours, with a one-way haul of nearly a mile.

The stones ranged from 4 to 30 inches in diameter, with some even larger. They were used for fill at two cottage lots at Lake Carmi, and to widen a farm road. Dewing used his small crawler dozer to level the stones as they were dumped. In all, six stone piles were cleaned up during the winter operation. Five more were loaded and hauled away in July 1960, with more stone-moving orders already in for the winter of 1961.

J. A. Dewing inspects widening of farm road with stone from his pasture.

The summer residents paid most of the cost of hauling the stones to their lots, and Dewing stood the remainder of the cost of hauling and all the loading and leveling at the fill site. Farmers who sign up for this conservation practice usually are eligible for Agricultural Conservation Program payments.

High-potential Cabot loam soils similar to those on the poorly drained but potentially highly productive Dewing field are found on more than 70,000 acres in Vermont. Stone pile removal increases the usefulness of such stone-cluttered land by at least 70 percent.

Stone salvaged from farm fields also may be used for on-farm filling, by local highway departments for road building, or for streambank riprapping.

Note:—The author is agricultural engineer, Soil and Water Conservation Research Division, Agricultural Research Service, Burlington, Vt.

Community Action in West Virginia

Brings Multiple Area Benefits

By Gordon S. Smith

SERIOUS flash floods so well known to past generations are nightmares of the past for Salem in West Virginia. Gone, too, are the water shortages that once threatened to strangle progress in the valley.

Community self-help turned the trick.

Floods, stemming from several tributaries in the Salem Fork watershed, formerly spewed muddy water across the valley at least once a year. The reverse problem of dangerously low municipal water supplies would show up 2 months later. In one 5-year period, more than half a million dollars in flood damages was shared by homes, farms, industry, business establishments, railroads, and highways. Heavy runoff gouged deep gullies in the steep hillsides. Displaced topsoil, averaging 23,000 tons a year, blocked stream channels. Twice since 1936, Salem had cleared the channels, only to have them fill in again.

Flood prevention in many forms had been tried unsuccessfully before 1953, when Salemites took advantage of new aid offered under the Federal pilot watershed program, forerunner of today's widespread small-watershed protection and flood prevention program that makes technical aid and cost-sharing available to local community organizations.

Small-watershed planning incorporates upland conservation measures with such downstream structural improvements as may be needed. Cost-sharing with local organizations was a "natural" for Salem. The community had an informal "self-help" group organized for years in the people's fight against flooding.

Congested channels like these formerly blocked runoff and flooded Salem with several feet of water.

With public backing and a genuine desire to have a better, flood-safe community, Salem formed the Upper Tenmile Watershed Association, with Herschel D. Wade, an automobile dealer, as president. The West Fork Soil Conservation District co-sponsored the watershed project.

Soil Conservation Service technicians designed a plan that called for seven floodwater-retarding dams, each with the capacity to hold back the water from a 3-inch storm. Another dam was designed to hold 60 million gallons for additional municipal water supply. The City Council sold $250,000 worth of 30-year revenue bonds to pay local costs of this dam. Four miles of stream-channel improvement was designed to give excess water safe exit from the valley.

The project's upland conservation plan included setting out more than half a million trees on 2,223 acres of eroded land, and protecting existing woodland by 46 miles of new fencing. More than 1,200 acres of grassland were earmarked for liming, fertilizing, and reseeding. Landowners speeded up the building of diversion terraces, grass waterways, and farm ponds, and making use of other conservation measures like contour stripcropping and wildlife food and cover plantings.

Everyone in the valley joined in to make a success of the program, which by August 1954 was complete and ready for operation. Fund-raising programs were conducted by local business interests and civic clubs. The Harrison County Court helped with legal expenses. The U. S. Forest Service helped with forest management. West Virginia's Conservation Commission accelerated its wildlife shrub planting program. The State Road Com-

Note:—The author is field information specialist, Soil Conservation Service, Upper Darby, Pa.

mission provided money for road relocation. The Agricultural Conservation Program conducted a special "sign-up" effort for cost-sharing on conservation measures in the watershed.

The structures were completed by mid-1958, when the upland conservation work was more than 75 percent finished. Runoff and erosion diminished, with conservation measures applied on 4,500 acres of land on the valley's 115 farms.

Even before completion of the project, Salem's 2,600 inhabitants were enjoying the benefits of the conservation work. A 2¾-inch storm came 3 months before the last structure was completed. Each finished dam had water 6 to 9 feet above the normal level behind the dam. Salem Fork stayed well within its new channels as it passed through town. It would have been another flood in years gone by!

The added 60-million-gallon guaranteed water supply ended water rationing. New business and industry now could be attracted to the valley by flood-safe sites and dependable water facilities, creating jobs for local people. Reduced sediment in the channels and less road and bridge damage have saved local funds for other municipal improvements.

Farmers can plant crops in their fertile bottom lands with little or no danger of flooding. Upland farmers grow better crops on their conservation-protected acres. In many locations, permanent pools behind flood dams are furnishing water for various farm uses.

Local fishermen have an added 20 to 25 acres of good fishing water in the new lakes. Wildlife has increased in the valley because of added acres of new food and cover plantations.

Even more significant than these multibenefits is the fact that the valley has improved its general economy through its own efforts. By thus augmenting available Federal and State aid, Salem has developed its natural soil and water resources to bring progress back to the valley. And it has done so with a return in benefits of almost $2 for every $1 invested in the project.

In accepting the 1959 "Watershed of the Year" award at the Sixth Annual National Watershed Congress honoring Salem Fork Watershed as the most outstanding watershed project of its kind in the Nation, Wade sounded the keynote to successful rural areas development like that represented in the Salem Fork watershed undertaking: "I represent a group of people, full of community spirit, trying with their best efforts to build a better community, State, and Nation."

Board of directors of Upper Tenmile Watershed Assn. that headed Salem Fork project: Left to right seated: Walter A. Holden, Kenneth Summers, Edwin J. Bond, Herschel D. Wade, and David L. Nicholson. Standing: Glenn L. Post and Harley D. Bond.

Cox-Rogers dam was the first completed in Salem Fork project.

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W. P. Stephens, New Mexico State University Agricultural Economist, says irrigation is a blessing to both agriculture and industry, because it not only has made arid lands productive and enlarged the livestock industry by increasing feed crops, but has supplied other industries with raw materials of food and fiber.

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The Mercer County Soil Conservation District in New Jersey has found that muskrat damage in farm ponds can be prevented by installing sheets of asbestos cement in the dam. The bottom of the barrier is 2 feet below normal water level and the top about 6 inches below the top of the dam. For dams already damaged, a mechanical ditcher is used to dig a 4½-foot trench in which to install the sheets.

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Americans of average means now enjoy meals undreamed of by the wealthiest people only 50 years ago.

Grass Is Key To Nebraska Rural Area's Improvement

By Oryl L. Fischer

SHERMAN County in Nebraska was one of the localities chosen in 1957 for a trial of the proposition that rural communities generally can provide most of their own power for lifting slowly developing areas to higher economic ground. Its experience has proved the idea is sound.

As in other pilot counties selected for the test through the Rural Development Program, Sherman County had areas where improvement was needed. Today's expanded Rural Areas Development Program operates on the premise that there are such opportunities in virtually every county in the Nation, regardless of its overall productiveness and prosperity.

Marvin N. Sather, resource development agent for Loup City area, on typical eroded hillside.

The whole economy of Sherman County rests heavily on agriculture. And, as one of the leaders in this "operation bootstrap" movement commented: "The place to start this kind of a program is with our land."

Arnold Scherzberg's big bluestem on cropland seeded in 1959 contrasts with old native grass pasture across fence.

The program got a timely boost from another federally sponsored program that went into action at about the same time. This was the Great Plains Conservation Program, designed to deal with the special soil and water conservation problems in that region. These problems stemmed in the beginning from a lack of understanding of Plains soils and climate in relation to how farming must be fitted to those conditions.

The Great Plains Conservation Program provides Federal cost-sharing and technical help through the Soil Conservation Service in getting the conservation job done faster. The landowner agrees to do the completed job on his farm or ranch in a systematic way, within his 3- to 10-year cost-sharing contract period.

When community leaders were sizing up their overall needs in Sherman County, it wasn't hard to pin a substantial part of the trouble on the way the land was being used. Too much of it—as shown by preliminary results of the countywide inventory of conservation needs—was cropland that was too steep or already too eroded ever to be a good business bet. A comparison of costs against year-after-year yields showed this kind of cropland was not paying its way, or contributing to the area's economy.

The inventory showed 60,000 acres of cropland unsuited to cultivation. This became a No. 1 target. The Great Plains Conservation Program and the Agricultural Conservation Program gave substantial help. In 3 years, farmers and ranchers in Sherman County have seeded 10,000 acres of their

---

Note:—The author is work unit conservationist, Soil Conservation Service, Loup City, Nebr.

Vernon V. Olson in 40-acre field terraced and seeded to native grass in 1959.

low-grade cropland to permanent grass cover.

Fritz Olson and his sons, Evert and Vernon, had some of this land conversion in their conservation plan. The Olsons turned 40 yearling steers into a 40-acre seeding of grass in the summer of 1961. After 2 months, you couldn't tell it was being grazed. The Olsons are convinced that this is the best use for this kind of land, and say it will pay them more than the grain they used to grow. And there are supplemental benefits:

''The grass is holding the soil,'' Olson Senior pointed out. ''Before we put the grass there, the road ditch kept filling with silt.''

Now the soil is held back on the land, and county-road maintenance is cut down accordingly.

The Sherman County citizens have been tackling other problems. The new cooperative grain elevator is one result of their conservation farming approach. The elevator had been sorely needed for more orderly and economical marketing of grain produced in the area. The county also now has a new fire control district, which will cut down on losses, and reduce insurance premiums. A new fire truck is giving everyone a feeling of greater security.

A countywide program to encourage farmers and ranchers to keep better books on their operations is making headway.

Due credit for rural development progress goes to men like Marvin Sather, resource development agent, and Sherman County's Maurice Reiter and Delbert Burton, board members of the Sherman County Soil Conservation District. But the progress made must be credited mainly to the enthusiasm with which all the people of the county have gone into the program, and to their willingness to do their part in carrying it through.

There are 885 farms and ranches in Sherman County. Many of them have some of the needed soil and water conservation installed. A few have all of it. The ultimate goal is complete soil and water conservation for all of the county's agricultural land. The people of Sherman County have had enough experience to be convinced that conservation farming and ranching is a fundamental step to their fullest rural area development.

REVIEW

THE SMALL PRIVATE FOREST IN THE UNITED STATES. By Charles H. Stoddard. 171 pp. 1961. Resources for the Future, Inc.: Washington, D. C. $2.00.

This book is the fourth in 5 years in which studies of forestry problems are reported directly or through grants by Resources for the Future. Each of them has been directed to the social and economic, rather than the physical aspects of the problem, in recognition of the fact that the underlying problem has to do with men rather than trees.

For those who have an allied interest, Chapter VII, Summary, provides an insight into the many complex factors, somewhat arrayed, which seem to have, in part, caused small woodland ownerships to be a problem. A factual account of ''Organized Group Efforts in the U. S. and the Scandanavian Countries'' clearly portrays the need for organized local leadership. The author logically concludes there are advantages to employing existing soil conservation districts for coordination of the different programs of assistance to small-woodland owners.

Additional justification for this point of view is the present interest in Rural Areas Development, and the many opportunities for soil conservation districts more agressively to encourage their cooperators who own small woodlands to use them for increased conservation benefits.

Another conclusion indicating the author's realistic attitude toward the so-called small woodland ownership problem is: ''The economic potentials of small private forests depend upon a number of factors: The forest itself; the general area in which the forest lies; the relationship of the forest to other activities of the forest owner; the projected demand for forest products; and perhaps others.'' This identification of the principal factors involved puts the small woodlands and their owners in true perspective in the individual and area economy.

In six other succinctly written chapters, Stoddard discusses the Small Forest and Its Significance; Economic, Institutional, and Natural Influences; Educational and Technical Assistance Programs; Modification of Unfavorable Factors in Private Forestry; Organized Group Efforts in Private Forestry; and Conclusions and Suggestions for Future Action. Each of these chapters merits serious study by those who have a responsibility or direct interest in public programs designed to assist owners of small-woodland acreages.

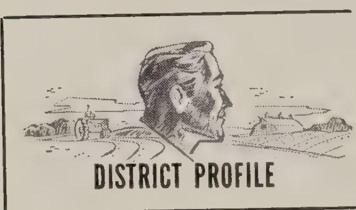
—T. B. Plair

Have You Seen?...

• *Cobalt Deficiency in Soils and Forages—How It Affects Cattle and Sheep,* Leaflet No. 488, a new Agricultural Research Service publication. This 5-page, popular-style leaflet tells why certain soils lack enough cobalt; why and how the deficiency affects cattle, sheep, and a few other animals; and what can be done to correct the deficiency in soils and to treat the animals.

◆

Fire killed more than 11,000 Americans last year.



Missouri Couple Conservation Team

G. W. MONTGOMERY of Pattonsburg and his wife have played a prominent role in soil conservation in Missouri for years.

"George and Dolores" are natives of Harrison County, where they operate 600 acres, specializing in hogs and beef cattle. George grew up on this farm, and is a graduate in agriculture of the University of Missouri.

Activity in community affairs comes second nature to the Montgomerys. George is serving his second term as chairman of the Harrison Soil and Water Conservation District board of supervisors, and is vice-president of the Missouri Association of Soil and Water Conservation Districts. He is a past chairman of the local hospital board and also is a member of the board of the Christian Church of Bethany.

The Montgomerys won the W.G. Skelly award for outstanding achievement in farming in 1945. George made Goodyear award trips to Litchfield Park, Ariz., in 1948 and in 1959 in recognition of his outstanding accomplishments in soil conservation farming. In 1950, he accompanied a group of farm leaders from Mid-America on a trip to Europe.

George and Dolores volunteered their farm for the main events for the National Plowing Match and Conservation Field Days in 1951. The contest was attended by an estimated 100,000 people.

Attendance at regular and special district board meetings, plus personal contacts and phone calls on district business, are all in the Montgomery day's work. Outstanding in George's work for soil and water conservation has been his leadership, along with that of his fellow supervisors, in organizing and operating small watersheds in the Harrison district. Two watersheds in operation, with one for which an application has been approved by the State Watershed Committee, cover 208,000 acres, or nearly one-half of the district.

Dolores and George Montgomery.

Dolores was 1960 vice-president of the Ladies Auxiliary of the National Association of Soil Conservation Districts. She attends State and national meetings, and is active in planning and organizing activities for Ladies Auxiliary organizations.

Finally, but of first importance, is the fact that a soil and water conservation plan is well established on the Montgomery farm—proof once again that the best salesman for conservation farming is the farmer who has a conservation program on his own land.

—Lee Bowen

FEBRUARY 1962

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE 1862 1962

Growth Through Agricultural Progress

Soil Conservation
25 Years Ago

"Projects throughout the United States prove not only that erosion can be controlled but that it is possible for the average farmer himself to undertake the conservation of his chief asset, the soil.

"Cost reductions, revealed by carefully kept records in all regions of the Soil Conservation Service, are being brought about as a worthwhile by-product of mounting efficiency and increased simplicity of methods."

•

"In various projects and camps many special tools have been devised which make it possible for the field work of the Soil Conservation Service to be done much more efficiently. Both major and minor pieces of equipment have undergone changes to fit them to particular tasks and to local conditions."

•

"At Sligo, Pa., costs of controlling gullies have been cut by the substitution of diversion ditches for expensive check dams, where that is feasible."

COVER—The march of urban developments onto farmland near Norristown in Montgomery County, Pa.

VOL. XXVII, No. 7 FEBRUARY 1962

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ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

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FRANK B. HARPER, Editor

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Rurbanization

A Major Conservation Challenge

By Donald A. Williams

IT is of significant interest to conservationists and any number of other people that a whole new set of words have worked their way into our everyday vocabulary —words like "rurban," "megalopolis," "urban sprawl," "suburbia," and so on.

These and companion newcomers to our current literature and conversation reflect an almost overnight public awareness of one of the most spectacular socio-economic phenomena of our times. That is the nearly complete swing of the pendulum from our erstwhile predominantly rural land occupany in the United States to today's overwhelmingly urban concentration of our 185 million people.

More than a million acres of our agricultural land is being shifted to suburban housing, industrial, highway and airfield, and other nonagricultural uses every year. Extremists on the one hand decry this trend as entirely evil, and one that must be halted at any cost. Others, equally extreme in their unconcern, contend we have nothing to fear, that we need never worry about where our food and fiber are coming from.

Fortunately, there is a middle-ground, which soil and water conservation is demonstrating with increasing conviction year after year to be feasible and practicable. It is a question of facing up to the realities of the situation—from both viewpoints.

First, the rural-urban population movement is not altogether black, as witnessed by the fact that our national production, income, and gross economy today are at an all-time high. More people, including the 1 out of 10 who are left on the farm, are enjoying more of the material good things of life than ever before. In any event, this urban movement is not to be denied. It is reality, and it will continue.

At the same time, we cannot close our eyes to a potential ultimate reversal of this still habitable situation. The future will not take care of itself if we do not take advantage today of those opportunities we have for avoiding major future land and water-resource problems. In short, we need to give attention to the conserving and orderly development of soil and water resources, in order to meet the demands of the 333,000,000 people we are expected to have in the United States by the year 2000, and to meet conceivable emergency needs.

> Rurban (blend of rural and urban). 1: relating to or living in a community, zone, or town which is principally residential but where some farming is engaged in. 2: situated or living outside of the city limits but not on a farm.
> *Webster's Third New International Dictionary.*

The Soil Conservation Service is the agency of the Department of Agriculture having primary responsibility for providing, on non-Federal lands in cooperation with other agencies, technical assistance in soil and water conservation planning and land treatment to landowners and operators and to communities in watershed projects. As such, it seeks to encourage a sane balance among conflicting demands upon the Nation's land and water resources. It has already been amply demonstrated in a number of affected areas that those concerned with resource use and management can work effectively to help bring about proper land use and sound soil and water conservation in rurban localities.

Good advice in the planning stage, for example, helps to avoid irreparable mistakes in land use, and provides for the future application of practical and beneficial conservation measures. The Soil Conservation Service works through soil conservation districts and local planning or other responsible groups in acquainting rural-urban interests involved with information on soils and some of the fundamentals of good land and water planning. That does not mean the Service helps prepare farm conservation plans as such in those areas; but there is an area of fringe suburban acreages that are not city lots—the "rurban" edge where urban developments spill over onto the rural farmlands—on which SCS gives counsel on soil and water land-use problems.

More and more responsible planning and other interests recognize that conservation of our soil, water, grass, timber, wildlife, and recreational resources depends upon community support and action. We are well on our way to developing a positive "community consciousness" of such situations, and should see more widespread results through such undertakings as multiple-purpose watershed development and still more activity in land-use and related resource planning and action.

California's Urban Sprawl

Brings Conservation Problems

By Fred W. Herbert

THE movement of people to the West Coast and to California in particular during the last decade has been described as the largest human migration in history. This "population explosion" is dramatized in the press as an unprecedented phenomenum.

Perhaps the earliest record of California as a population-attracting magnet was a statement made more than a century ago, in 1846, when Pio Pico, the last Mexican Governor of California, lamented:

"We find ourselves suddenly threatened by hordes of Yankee emigrants, who have already begun to flock into our country, and whose progress we cannot arrest. Already have the wagons of that perfidious people scaled the almost inaccessible summits of the Sierra Nevada, crossed the entire continent, and penetrated the fruitful valley of the Sacramento. What that astonishing people will next undertake, I cannot say; but in whatever enterprise they embark they will be sure to prove successful."

Resource conservationists, who believe that welfare of people rests on the productive capacity of soil and an abundant supply of water, have attempted to assess the impact of today's urban development upon these resources. They also recognize that people must have living space, but that guidance is needed to minimize the effects on land and water resources.

News stories in 1955 told how farmers were being pushed off the land by growing cities. The articles pointed out that of 100 million acres of land in California, only 14 million acres were cultivated, including 7 million irrigated acres. They said that since World War II, approximately 40,000 acres of farmland had been taken over by approximately 22,000 residential subdivisions.

In many instances, farmers have been forced to sell when their lands were taxed at potential subdivision values rather than on the basis of agricultural production. An article published in 1961 cited specific instances of tax increases on farmland, ranging from 139 to 650 percent. It stated that ranchers felt there is no justification for assessing on the basis of land-speculation activity when the land is still in farming and the owner's intention is to continue to farm it.

Much more has happened to land in California since 1955. Farmlands in so-called "pressure" subdivision areas have sold for 4 to 10 times their value as farmland. Adjacent farmland has been assessed accordingly. This has been the law.

The California Association of Soil Conservation Districts, representing 160 districts covering about two-thirds of the State, has been uneasily watching urban sprawl and its conquest of more and more of the State's best farmland. And the 1959 report of the California

Home builders move into English walnut orchard on Class I land in Contra Costa SCD near Walnut Creek, Calif.

Note:—The author is assistant State conservationist, Soil Conservation Service, Berkeley, Calif.

This County of Santa Clara Planning Dept. picture in California shows how many small subdivisions eventually join to form the pattern of urban sprawl.

Soil Conservation Commission referred to this movement as "the Octopus of Urbanization." A report about that time by Karl J. Belser, director of planning for Santa Clara County, warned:

"Recent surveys show that in California not a single metropolitan area where high intensity agricultural development exists has escaped the pressure of the urbanizing process. Since over 50 percent of the State's best soil lies in such metropolitan areas the threat of overrunning this soil is obvious."

Estimating that for each person who comes into the State, one-fourth of an acre of land will be taken out of other uses and placed in urban use, Director Belser reached the conclusion that "If urbanization follows its present pattern, that is, absorbing all the flat valley land, it is possible that by 1990 there may be no agricultural land left in the State." He found that close to 756,000 acres of fine agricultural land already may have been overrun, even though it was not all built up, in the Los Angeles-San Diego area, the Central Valley, and the many coastal valleys.

It was about the same time that a soil and water study was begun in California as part of the National Inventory of Soil and Water Conservation Needs. The State-by-State, county-by-county inventory was made cooperatively by representatives of the Soil Conservation Service and other U. S. Department of Agriculture agencies with other Federal, State, and local agencies and groups concerned.

The California inventory, completed in 1961, estimated that 1,672,800 acres will be going into urban uses by 1975. Of this acreage, 1,217,000 acres is in the better I to IV land classes, and 758,000 acres is now in cropland. Total cropland acreage is expected to increase by only about 5 percent by 1975, despite the expectation that the State's population will increase to 21 million by then, or an increase of about 60 percent over 1961.

This indicated shift of land out of agriculture into urban use is a significant inventory finding. Such losses, in the face of a greatly increased population, can have a major impact upon the whole country. California, for example, produces, among many other crops, most of the almonds, walnuts, dates, plums, prunes, apricots, avocados, peaches for canning, lemons, figs, wine grapes, early table grapes, olives, and artichokes grown in the Nation.

Also significant is the fact that urbanization is intensifying and complicating watershed problems and making it more necessary than ever to protect lives and property from floods. The State conservation needs inventory found that a thousand watersheds will need project action by 1975, on some 18 million acres.

California has undergone a period of experimentation with legislation designed to protect farmlands from urban encroachment. The Legislature passed a "pilot" bill in 1955 designed to limit the annexing powers of cities as they affect areas zoned exclusively for agriculture use. A

second bill passed in 1957 directed assessors to use only the value of land as it relates to agricultural use for assessment purposes.

A concurrent resolution passed by the 1961 California Assembly and Senate will place a constitutional amendment before the voters in 1962. This amendment provides for the assessment of land used for agricultural purposes to be based on agricultural factors only. It also provides that if such land is diverted to another use, it shall be subject to additional taxation, under specified conditions.

Governor Edmund G. Brown voiced the sentiments of Californians concerned over the future of natural resources when he said at the 1960 convention of the California Association of Soil Conservation Districts:

"As Governor, I do not intend to preside over the liquidation of much of the finest agricultural land in the Nation, indeed in the free world. This administration cannot sit idly by while unchecked disorderly urban expansions erode and obliterate our agricultural resources. Failure to act boldly and wisely now will mean that much of our irreplaceable cropland . . . will become part of the tragic inventory of natural resources carelessly lost forever through man's greed and ignorance. This must not and will not be."

Soil Surveys Help Urban Planners

By Bernhard A. Roth

PLANNERS of fast growing urban communities in Connecticut have turned to the soil scientists for help.

As a result, a newly found, common interest in soil and its potentials has created an unique partnership between city men and farmers in Hartford, Danbury, Stamford, and half a dozen other localities. Professional planning consultants have prophesied that the exchange of soil knowledge now going on between dairymen and crop growers on the one hand, and urban officials on the other, may revolutionize methods of community planning and zoning.

Soil maps, it was found, reveal considerably more than where to place cornfields and pastures. Interpreted by Soil Conservation Service technicians, the maps also show the severity of slope and erosion, wet and dry areas, flood hazards, and seepage problems. Here was intelligence that fascinated developers.

After a session on soils information with farmers of the Fairfield County Soil Conservation District, Danbury's town planners requested a special soil map of their 42-square mile domain. Farmers and their assisting SCS technicians responded by providing what they termed an "abbreviated" map of local land resources, that gave a full-length portrait of soil and water conditions. Using it as a base reference, Danbury's professional planners designed a master layout to allocate housing, industry, schools, shopping centers, and roadways for 30,000 additional

This home development in Fairfield County, Conn., is on the hill in Ansonia overlooking the Housatonic River.

Note:—The author is field information specialist, Soil Conservation Service, Upper Darby, Pa.

L. to r.—Walter Wachter, director of planning and zoning; Mayor J. Walter Kennedy; David B. Thompson and Albert E. Newby, both of SCS, discuss Stamford, Conn., land resource unit map.

residents expected in the future.

Third-dimensional information furnished by the soil survey gave planners an outstanding advantage. It no longer was necessary for them to guess at what construction men might face. Eleven different land-resource classifications outlined by the map showed underground phenomena, in addition to surface features. For example, a tracing of upland soils indicated that water-infiltration rates likely would be too slow to handle septic seepage, and that road construction and maintenance would be costly.

Poor sites for houses and industry were markedly clear in soils mapped along streams and rivers. There, soil scientists pointed out, developers would face double-trouble in the form of difficult drainage and frequent flooding.

Planners looked closely at the map's delineation of terrace soils. Here, soil surveyors had underlined a potential for nearly all types of agriculture. Likewise, they had noted the soil's eminent suitability for high density, urban development—good drainage, flood-free, and affording easy excavation. Danbury and towns that had followed suit in requesting resource maps over the past year have received, in essence, a rating of all local soils according to such limitations as drainage, suitability for septic tank functions, flooding hazard, depth to bedrock, stoniness, and excessive slope.

Section of land resource unit map depicting Stamford's soil inventory.

Communities have drawn upon the maps heavily to substitute orderly progress in place of chaotic, urban sprawl. Decisions as to type of development, as well as location, have been supported by the natural resource data. Rulings as to size of houselots have been less subject to criticism when bolstered by scientific soil findings. Real estate men have been guided to money-saving land treatments prior to building. Inexpensive and previously unknown sources of road-fill and landscaping materials have come to light by means of the maps.

The soil map method also has offered a hedge against the endless monotony of subdivision. For instance, Stamford used its resource guide to allocate a 30-acre swampy area as a wildlife preserve. Similarly, Danbury, flood-terrorized in recent years, has dedicated streambank areas to the interests of naturelovers. The same areas will serve to protect sites for future flood-prevention structures.

A few of the towns are planning to purchase easements aimed at reserving their richest farmlands. Use of the resource maps to locate and conserve future water developments is a noticeable trend in all communities involved in the current movement.

Farmers in the Fairfield County SCD in the county's northernmost town of Sherman feel that farming should be preserved as long as possible.

Virginia's Fairfax County Outstanding In Rurban Action

By J. E. Beard

AN article in a Washington, D. C., newspaper on January 1, 1961, stated that during 1960 fifty-two manufacturing plants located or made final plans to locate in Virginia, bringing employment to about 4,100 persons. In addition, 49 plant expansions were announced during this period, affecting approximately 4,000 additional employees in 33 of these expansions.

The report did not include new establishments in wholesaling, retailing, agriculture, transportation, or Government; but it gives a brief picture of expanding industrialization throughout the State.

The impact of these new manufacturing plants is greater than most persons realize; because, for each person employed by the industrial plant, another person is needed to provide the goods and services in the community where the plant is located. Additional people are employed to bulldoze the soil; burn the trees, farm houses, and barns; bury the wire fencing; dig the sewer lines; lay the water mains; build bridges; and otherwise cover up little streams. As soon as these operations are completed, the roads and streets have to be resurfaced; since those already existing were chipped away, and cracks and soft places have developed in the new ones hastily built.

Next come additional filling stations, lunch bars, trailer parks, and school teachers. Then someone has to build housing to replace the trailer parks and school rooms to house the school teachers and children.

Fairfax County's population jumped from 98,000 in 1950 to 240,025 in 1960, while farms declined from 1,656 to 428. Our experience in the Northern Virginia Soil Conservation District seems to indicate that we would be remiss in our duties and responsibilities if we did not use the entire resources of the Soil Conservation Service, including its professional leadership and technical staff, to defend the basic principles on which the conservation program has been established. If efforts are started soon enough, engineers, builders, and developers in rurban areas soon learn that many potential problems are avoided, many thousands of dollars are saved, and the people in the surrounding rural areas are assisted immensely.

Fairfax County's urban development had not reached Leo. J. Rocca's 206 acres of grassland farming in Northern Virginia SCD.

My second observation is that potential rurban expansion causes a period of uncertainty. Farmers are reluctant to make permanent improvements in buildings, fences, soil fertility, drainage, and soil and water conservation, even though prices of farmland begin to rise and local markets expand. There is also a tendency to exploit some of the fertility already there —sell sod, topsoil, etc.

Thirdly, when urbanization starts in a given area, prices of farmland begin to rise out of proportion to those of agricultural areas a few miles away from this point. According to U. S. Census figures, prices of farmland, plus buildings, in Fairfax County were $113.69 per acre in 1940, $356.28 in 1950, and $752.53 in 1960; whereas, the average value of farm real estate, including buildings, throughout Virginia in March 1960, was listed as $141.15 per acre. Our $750 an acre land does not produce higher crop yields, or carry more livestock per acre than the good $141 an acre land in other areas.

It should be pointed out here that Fairfax County is not the only county losing farms, since the Federal Census also shows that during 1954 through 1959 the number of farms in Virginia dropped from 136,416 to 97,623 with an average loss of 7,758 farms per year during this period.

Next on the list is the expansion of public services such as schools, libraries, sewer lines, water mains,

Note:—The author is Fairfax County Extension agent and secretary of the Northern Virginia Soil Conservation District, Falls Church, Va. (Excerpts from talk at 1961 meeting of the Virginia Association of Soil Conservation District Supervisors.)

his 1937 aerial photo taken over a northeastern Fairfax County, Va., area hows the sparse development and open country still typical in most outlying environs of the Nation's capital.

olice protection, and recreational arks. Taxes increase and farmers nd landowners have to share in he increased tax burdens, even if hey do not use the increased ublic services provided by rurban xpansion.

The multiplying public and priate agencies in a metropolitan rea which have, or should have, continuing interest in conservaion present constantly increasing pportunities for extending the onservation effort. We have never een able to keep all of our contantly changing public officials nformed with respect to the posiion, responsibilities, and performnce of the soil conservation disrict, and progress toward a comnon planning and coordination of ffort leaves much to be desired.

In soil conservation districts overing rurban areas, the superisors can make their greatest conribution toward the broad objecives of the conservation program y a continuing effort to encourage nd coordinate participation in hat program by other interested ocal, State, and Federal agencies, and by taking a lead in those situations where the independent action of the other agencies may be difficult or impossible because of limits of jurisdiction or authority.

You cannot separate soil and water conservation problems of rural or urban areas. Sooner or later each group is taxed to pay for the costly mistakes of the other. The Northern Virginia Soil Conservation District found it necessary to revise its work program in 1958 to include rurban problems.

Use of a detailed soil survey is absolutely necessary in rurban as well as rural sections if those responsible for the use of the land are to make wide decisions based on fact. In Fairfax County, the farmers, the County Planning and Zoning Commission, the Health Department, the Department of Public Works, the County Department of Schools, and the Department of Assessments all are using a detailed soil survey. A full-time soil scientist is hired by the county and attached to the local Farm and Home Department so that through him, along with the Soil Conservation Service, the Agricultural Stabilization and Conservation Office, the Forest Service, and the Extension Service, all citizens,

This view of the same area taken in 1953 shows that urbanization got an early start here. Today, such urban congestion has spread into much of Fairfax and other Virginia and Maryland counties in the southwestern corner of the Atlantic Seaboard Megalopolis.

including real estate developers and individual homeowners, can receive the best possible information.

I am convinced we are saving the local county government several thousand dollars a week in their construction costs alone. Much more ultimately will be saved through the prevention of costly mistakes in the handling of our rurban soil and water problems. Our experience in Fairfax County indicates that the proper use of soils is our number one common denominator. We believe it will continue to be so in all rurban areas for some time to come.

Georgians Meet a Rurban Problem

Head On—*and Fast*

By Sellers G. Archer

THE people of Muscogee County in southwestern Georgia moved fast in doing something about the flood and other problems brought on by rapid urbanization of farmland in the Bull Creek watershed.

Instead of waiting its regular turn to get Federal help in planning the watershed for its protection and flood prevention, the county reimbursed the Soil Conservation Service $8,000 for the cost of a preliminary survey, and then about $30,000 more for costs involved in making the completed watershed plan. And to avoid any delay in obtaining voluntary easements, the county voted a $600,000 bond issue—even before Congress had approved the watershed plan—to buy all the structure sites, except one on the Fort Benning Military Reservation.

This family had enough of drying furniture and cleaning after floods and was moving.

Next, in order to get construction started as soon as possible, it set its engineering and land procurement departments to mapping land ownerships and the area needed for purchase. The first three sites already were being cleared for construction in the fall of 1961.

The project thus is conspicuous for the full cooperation between the urban and farm groups concerned and unified action by the county government and the Pine Mountain Soil Conservation District.

Prime mover behind the watershed undertaking has been John Rigdon, a practicing soil conservationist for 30 years and a supervisor of the Pine Mountain district since it was organized in 1939. When he couldn't get the county or city governments to push the watershed project the way he thought they should, he ran for county commissioner and was elected. He ''sold'' the project to his colleagues, to every important organization, to most of the business leaders, and to landowners up and down the watershed and the citizens of Columbus.

Rigdon carried maps around for 3 years to help explain watershed project.

For many years Rigdon ran a dairy on Lindsey Creek, near Columbus. Between his farm and town ran Weracoba Creek. Both are tributaries of Bull Creek. He saw every flood on both creeks and on the main stem of Bull Creek.

Urbanization hit the Weracoba watershed first. Rigdon saw the floods become more fierce and destructive as more land was put under buildings and concrete and compacted yards. Now the Weracoba watershed is almost completely urbanized, and it will cost many millions of dollars to solve the flood problem.

The town grew rapidly, and

Note:—The author is field information specialist, Soil Conservation Service, Spartanburg, S. C.

Rigdon finally sold his home farm for urban developments. As additions leap-frogged up Lindsey Creek, he saw floods growing worse there, too. A flood back in March 1943 covered a large part of his pasture. There now are 50 to 75 homes within this flood area, and the same kind of rain today would push the high water mark nearer to the 100-year flood stage.

This is just one of many rurban areas subject to flooding. Where Lindsey Creek joins Bull Creek, there is a flat area where 1,200 homes are subject to flood damage. In one newly urbanized area, the county airport contributes to the depth of flooding. When it was built, the runoff from farmlands above could be carried in a 108-inch pipe under the 30-foot fill on which the east runway is built. Now this outlet is inadequate, and a flash flood backs water into homes. When the watershed above is fully built up, two more 108-inch tubes, estimated to cost $361,000, will be needed to handle the floodwater.

Growing floods have caused increasing damage to roads, bridges, farm and urban improvements, and to farmland. Other land cannot be developed, because of the flood hazard. Sediment from upland erosion must be dredged from stream channels each year.

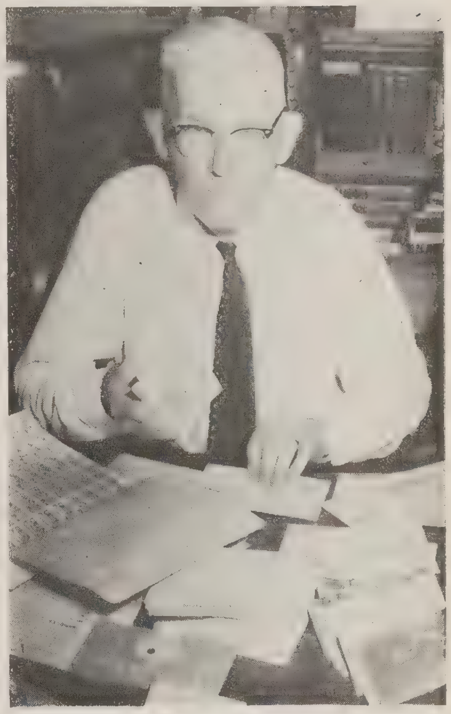
"Channel maintenance and bridge repair cost $50,000 to $75,000 a year," Rigdon said. "And there seemed to be no end to these steadily mounting costs as the town expanded—at least there wasn't until we developed a plan for the watershed where there are still rural areas and room for the establishment of protective measures."

The plan calls for 11 floodwater-retarding reservoirs and 12 miles of steam-channel improvement. Some of the sites are surrounded by built-up areas, and a few houses will have to be moved or protected by dikes. Others on farmland are within Columbus' prospective expansion area. The county accordingly plans to develop each site, of about 100 acres, as a recreation area, with a lake (the sediment pool) averaging 18 acres.

The Bull Creek watershed plan also includes cropland contour farming, stubble mulching, cover cropping, and other practices; nearly 4,500 acres of pasture planting or improvement; more than 9,000 acres of timber-stand improvement or tree planting; and treatment of critical areas.

East Linsey Drive runs through Rigdon's old dairy farm.

Conservation With Tax Notices



Lee County Treasurer Frank Deschamps preparing tax notices for mailing with conservation brochure.

"Lee County (S. C.) is the garden spot of the Carolinas" has become the theme of an annual pubblication mailed by County Treasurer Frank J. Deschamps to taxpayers. Three pages in the one issue told why. In them, Soil Conservation Service technicians discussed the county's productive land and reported on soil conservation activities.

Deschamps' first three issues of, "Interesting Facts Concerning Lee County" were 4-page folders containing general statistics and tax information. Then in 1959 the folder was doubled in size, and included reports from the agricultural agencies, with the soil conservation postage stamp featured on the back page. The water conservation stamp was featured in 1960.

Deschamps says he has had favorable comments from all over the country.

Non-farmers In Pittsburgh Area

By William Lucas

PENNSYLVANIA'S Allegheny County with the city of Pittsburgh as its hub is one of the many metropolitan areas of the country that have experienced the march of homes and shopping centers through the farmlands and open areas of a few years ago. One-half of the 467,000 acres within its boundaries already is classified as urban, and within 10 years an expected 20 percent of the remaining acres will be.

Directors of the Allegheny County Soil Conservation District, working with the Soil Conservation Service, recognized the need for a policy to guide them and cooperating agencies in meeting their rurban conservation needs. Requests for technical assistance on soil and water conservation problems from landowners other than farmers increased each year. Today, 8 out of 10 soil and water conservation inquiries come from non-farm landowners! A work plan accordingly was developed which budgeted the district's resources to meet this demand.

In some areas, the demand for technical assistance by rurban landowners has been in competition with that from farmers. In this district, the needs have been compatible. The district directors believe that developing a plan to budget their resources has enabled them to satisfy the conservation needs of both groups.

Odds are good that any time earth is moved in Allegheny County, erosion will become a serious problem if the soil isn't quickly tied down with vegetation. But requests for assistance are varied. They range from stabilization of a critical area caused by construction on a 30 percent slope to working with the County Parks Department on long-range plans for conservation development of the 7,000 acres in the park systems.

Planning help for water-disposal systems is common need in new subdivisions.

Building houses in hilly country causes soil and water problems.

There is an intense interest in conservation on the part of many rurbanites. The J. Lewis Scotts of Fairview Heights, a small community a few miles east of Pittsburgh, provide a good example. The acres surrounding their home appear to have been transported from an untouched forest. Native hardwoods blend with transplanted wildflowers and shrubs. In 1960, community progress required the construction of a sewage system through Powers Run, a small, undisturbed stream running through the Scotts' property.

Anxious to restore the glade to its natural beauty, the Scotts and cooperators of the Allegheny County Soil Conservation District developed a rurban conservation plan, which included riprapping of the streambanks to contain the stream in its bed, and

Seek Most Conservation Help

eph A. Krivak

Seeded and mulched slope was stabilized in 6 weeks.

treatment of critical areas to minimize erosion. Plantings included grasses, legumes, shrubs, and conifers to stablize the streambank and surrounding areas, and also to provide food and cover for wildlife.

The Scotts' interest also has included conservation projects at the community level. As a member of the O'Hara Township Park and Recreation Commission, one of Mrs. Scott's goals is setting aside areas in which the natural features are integrated with recreational needs. Three of these "parklets" have been obtained, and a nursery has been established to provide seedlings for these and other areas.

Additional planning assistance was given to the Park and Recreation Commission on Meadow Park, overlooking the Allegheny River and a large part of Pittsburgh's industrial complex. A Little League Baseball diamond has been developed and the rest of this 34-acre park is being developed for recreational activities. The conservation program includes a water-disposal system, tile drainage, reshaping and vegetating banks, and planting tree and shrubs for erosion control, wildlife food and cover, and aesthetic purposes.

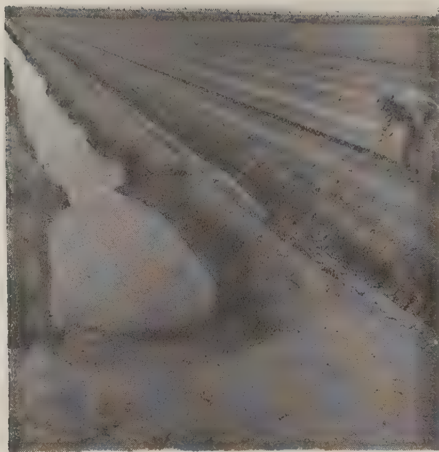
Soil Conservation Service personnel also has given technical assistance to the Fox Chapel Park Commission in the development of a 35-acre wildflower and wildlife sanctuary. The heavy use made of this area caused soil and water conservation problems which needed prompt attention to streambank stabilization and critical-area treatment.

Level land, much prized for industrial development, no longer is available in Allegheny County. Industry, like the homeowner, has had to use less desirable sites. Land-use problems are a predictable hazard in these cases. A typical example is the 50-acre research center of a Pittsburgh glass company. The center is on top of one of the ever-present hills in this part of the State. Construction left steep, raw banks where leveling operations stopped. Water running off the acres of roofs and parking areas resulted in almost 100 percent runoff. Leading the water safely down or around the steep slopes was one of the foremost problems. Here design and construction were based on the knowledge that failure in this area of high hazard would be costly.

Almost without exception, rurban landowners also have as one of their primary objectives development of their land to increase wildlife food and cover.

Community development of water resources for recreation is increasing.

Note:—The authors are, respectively, work unit conservationist, Pittsburgh, Pa., and State soil conservationist, Harrisburg, Pa.



Vegetable beds on cleared flatwoods land to be planted to grass and clover after 1 or 2 years.

Grass Rotations Boon To Florida Vegetable Business

By C. B. Blickensderfer

FLORIDA landowners are using grass in rotations to renew their soil and help keep the State in the winter vegetable business.

In South Florida, where high-value vegetable and flower crops require soil relatively free of disease organisms and insects, landowners used to let the land lie idle after the growers to whom they rented it had raised only one or two vegetable crops. It stayed out of production until the soil was renewed by native vegetation. The owners received little or no profit from this volunteer range. Money spent on drainage and irrigation systems brought them no returns until the land could be rented to vegetable growers again.

South Florida is a relatively flat area of sandy soils, with many marshes and natural lakes. Elevation ranges from sea level to 25 to 100 feet in the interior. The low, grassy swamplands known as the Everglades are in the extreme south, but the area actually includes all of the peninsula as far north as Daytona Beach. It contains 17 million acres.

For years owners cleared the land in blocks of 100 to 200 acres, protected it from flooding by dikes, and ditched it for drainage and subirrigation. Vegetable and flower growers leased the land for one or two crops. When there was excess water it was pumped out of the ditches and over the dikes.

Ordinarily, irrigation is needed during most of the growing season, and water is pumped into the ditches to provide seepage irrigation. That meant, too, that a water supply had to be available.

Then, after one or two seasons, the cost of fighting plant diseases and insects became prohibitive, even with the efficient chemicals that have been developed; and the costly, highly developed fields had to be abandoned. But this is no longer true, thanks to the grass-vegetable rotations soil conservation district landowners are working out with Soil Conservation Service technical help.

A relatively inexpensive, highly productive pasture of bahia and pangola grasses can be established immediately. The residue of the high fertilizer on vegetable crops gives the grass a quick, strong growth. Then white clover is overseeded to improve the pasture.

Drainage and irrigation facilities provided for the vegetable crop are used to keep the pasture producing at top efficiency. Good management practices are used. Carrying capacity often reaches two cows, with calves, to the acre.

After 3 to 5 years of profitable pasture use, the land again is ready for vegetables, with their production as good as on virgin soil.

This conservation practice not only is aiding Florida's winter vegetable business, but also adds to the improved pasture that helps give the State a high ranking position in the cattle industry.

Note:—The author is plant materials technician, Soil Conservation Service, Palmetto, Fla.

Irrigated pangola grass-clover pasture following vegetables produces high beef gains.

Puts Seep Water To Work All Around the House

By Gordon S. Smith

Tile lines and desilting boxes insure clean, fresh water for swimming pool.

SUBURBAN homeowners with water-seepage problems might take a tip from the experience of a New Hampshire farmer.

Michael Maloney of Somersworth turned seep water that bogged down his new homesite into multiple-purpose benefits by laying tile lines under the 1-acre plot and collecting the otherwise useless water for use in his house and to fill a backyard swimming pool.

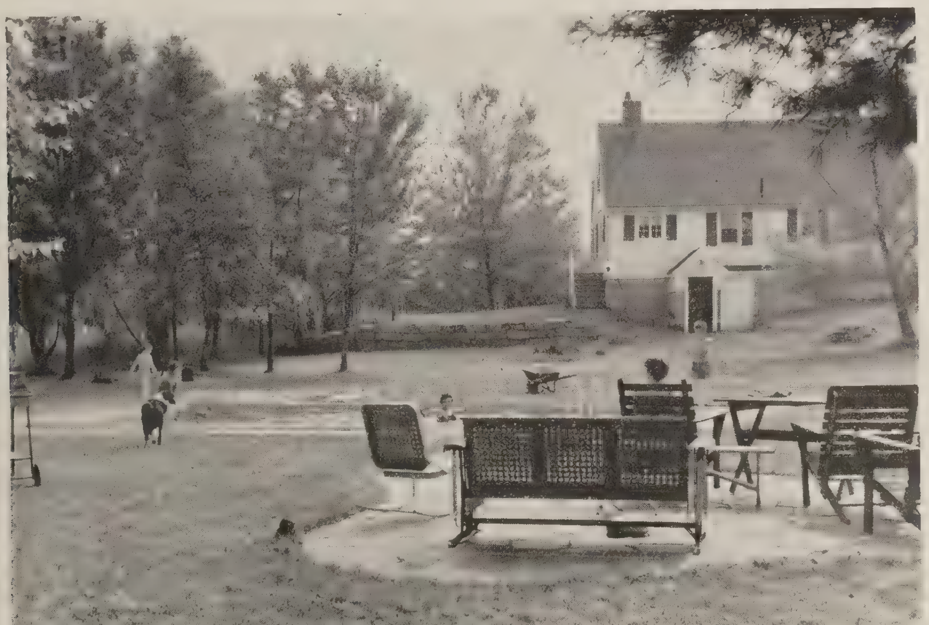
The Maloney family bought their 88-acre farm 21 years ago. Mike remembers fishing in the old mill pond, though it was largely filled with silt. His father attempted to dry up the area by filling the pond, but the ground was always too wet to use.

By 1947, Mike was a married man and needed a new home.

''The old pond site next to the river was always my favorite spot,'' he recalls. ''Dad gave me the useless land and thought I was crazy to try to build there. It was wet, but I had an idea.''

Maloney had learned a few tricks about soil and water conservation from Soil Conservation Service technicians working with the Strafford County Soil Conservation District, who had helped his father plan conservation work on the farm. Tile lines under wet pastures had done wonders then. Maloney figured they should work as well on a homesite.

While the house was being built, he laid a tile line all the way around the foundation. He put in a cement desilting basin and a small storage well behind the house, and ran pipe from there into the house. A $\frac{1}{3}$-horsepower pump put the water into the house water system.



The Maloneys enjoy their improved recreational area.

''It hasn't run dry in the 13 years we've had it,'' Maloney says.

The one tile line cut water seepage around the house, but the backyard was still wet. He next intercepted two main seep areas with two more tile lines and joined them in a desilting box near the first tile line. This made a total of 200 feet in all.

Then he built an 18x36-foot cement pool about 40 feet from the new lines, with a pipeline from the desilting box to a second box near the pool. There the water had to seep through sand and gravel to flow, by gravity, into a third box next to the pool. From there, cool, clear water, up to 12 gallons a minute, runs into the pool, even in dry weather. Maloney added a cutoff valve so that, with all the lines feeding in, he can fill the 35,000-gallon pool in about 36 hours.

When the pool needs drainage, a valve opens a pipe at the pool bottom and sends water through the overflow pipe to the river, about 20 yards away.

Maloney estimates that by laying the tile himself, the pool and drainage cost him about $1,000.

Note:—The author is field information specialist, Soil Conservation Service, Upper Darby, Pa.

Report of the Administrator Soil Conservation Service 1961

THE Soil Conservation Service found itself in perhaps the most active and productive period in its history as the 1960-61 fiscal year ended and the new year began. The increasing challenge to its technical capacities reflected, in turn, accelerated public awareness of soil and water conservation problems and needs, and the determination of responsible leaders—local, State, and Federal—to move ahead on the conservation job at a faster pace realistically timed to its urgency.

Watershed-protection and flood-prevention projects, of the widest public appeal and community benefit among the programs in which the Service has nationwide responsibility, were representative of the steady upward progress in the conservation march ahead. So was the achievement of soil conservation districts, which the Service has primary responsibility to serve with technical help. The number of landowners signing Great Plains Conservation Program cost-sharing contracts during the year further reflected the healthy conservation progress of the Nation as we moved on into the challenging 1960's.

Another key guide to conservation planning and action was beginning to be made available during the first half of 1961 to agricultural, planning, and other people who need it. That is the information developed in the Department of Agriculture's cooperative National Inventory of Soil and Water Conservation Needs.

There are several significant aspects to these correlated approaches to the Nation's complex land-use and water-management problems. Each of these programs or activities has demonstrated its effectiveness in meeting the particular need for which it was designed; but, operating together toward a common purpose, their impact in moving conservation ahead to strengthen the national economy is multiplied.

All of them, for example, are contributing to sound rural area development, a most important aspect of our whole economy in these fast-moving times of declining farm numbers and of mechanization, continuing shifts in population from agricultural to urban areas, and other trends. Thus multiple-purpose watershed projects, because of their basic community organization and goals, are particularly well adapted to carrying out rural areas development. So is the Great Plains Conservation Program in hazardous climatic areas of that region. And so are soil conservation districts, which first demonstrated the practicability and effectiveness of the rural community improvement approach to land and water and related problems. Soil survey and conservation needs information already is or can be a basic tool for use in rural area planning and development.

Many trends in agriculture, and in the national economy of which it is such an important part, influence the direction of soil and water conservation. The trends of recent years, plus the necessity for a healthy, profitable agriculture, give further indication of conservation direction. Even though the production capacity of our cultivated lands is greater now than current demands for food and fiber, at least for several commodities, this fact does not lessen the necessity for continuing aggressive soil, water, and plant conservation for managed abundance.

The United States is undergoing significant adjustments in land uses, and will continue to do so. Whether one accepts the low, medium, or high estimates of population increases by the years 1975, 2000, or 2010, pressures on these resources will pyramid. As confirmed by the conservation needs inventory, significant shifts out of agricultural uses into nonagricultural uses such as industry, recreation, transportation, water surfaces, and living space will continue at perhaps an even faster pace. There will be shifts, also, from grass and woodlands into cultivation. It is probable that by 1975 there will be but a small net decrease in cultivated lands and forest lands, but significant increases in grasslands.

Note:—This article is a digest of a report for the fiscal year 1961 submitted to the Secretary of Agriculture by Donald A. Williams, Administrator of the Soil Conservation Service.

We are at the beginning of a new and decisive period in our national conservation effort. To meet our food and fiber needs a scant 15 years hence, to say nothing of the year 2000, we will need the production equivalent of 200 million more acres, as based on 1956 yields. This production patently must come largely from existing cropland.

So it is that, even by 1975, there will need to be improvements in soil management, disposal, or prevention of excess water on good soil, added water for dry soils, reduction of soil losses resulting from water erosion on sloping lands and wind erosion on dry lands, improved soil-moisture-nutrient relationships, and such other adaptations of conservation technology as are consistent with soil capability and efficient farming. All relate to the fundamental base—the soil—for agricultural production in the amount needed when we need it.

Current and emerging trends in American agriculture continue to lead to the need for more, not fewer, specialized services in soil and water management, from both private and public sources. This fact emerged more clearly during the last fiscal year than ever before. Meanwhile, the Soil Conservation Service has sought to gear its efforts to the changing times; because the essence of conservation is concern for the future—not the preservation of the past.

Among the situations coming more sharply into focus is the increasing significance of the characteristics of the thousands of different soils, especially with respect to moisture and fertility relationships, with more attention needing to be given to the trace elements and to managing moisture availability. Another has been the necessity of giving more attention, in view of the out-of-agriculture trends in land uses and the need for more water impoundment, to shifting low-capability land to recreational, residential, defense, and other nonagricultural purposes. This calls for matching land use better to its capability, with intensive cultivation on the better land and the use of marginal lands for grass or trees.

Much land needing conservation treatment no longer is farmland. Conversion of open country to residential, industrial, and other nonagricultural uses, at the rate of more than 1 million acres a year, leads to such complex problems as finding stable soils that will support structures, preventing floods and sedimentation of streams and reservoirs, providing drainage and sewage disposal, and adjusting taxes. The public interest therefore calls for conservation of soil and water irrespective of agricultural production needs.

The same conservation programs, services, and information that serve in rural areas continued to prove themselves during the year in these nonagricultural situations, especially the small-watershed and soil conservation district programs, including soils and conservation needs information. The Service more recently has been called upon for more and more consultation concerning conservation problems on nonagricultural land. Such technical advice is limited to assistance covered by agreement between soil conservation districts and landowners, and is provided through official boards and groups of owners.

Although modern science and technology continue to change the goals and methods of conservation, they have not altered the underlying principles which must guide its application if conservation is not to be fragmented and proper local governmental and agricultural leadership by-passed in carrying out needed conservation works. It has continued to be Service policy to encourage in every way possible that these fundamentals are adhered to. One is that the people concerned have a desire to get the conservation job done, and the incentive to move ahead in doing it.

Another is that farm and ranch conservation planning is the key to getting conservation done, whether through soil conservation district programs, watershed-protection and flood-prevention projects, or the Great Plains Conservation Program. It also is important that the farmer examine his conservation program from time to time, to make sure he is not doing just "patchwork" conservation but that his program is related to his total resource needs.

By the same token, the Soil Conservation Service and soil conservation districts have found it is important for them to keep their programs up to date, in order to keep abreast of changing conservation needs. To this end, consideration is being given in the Department of Agriculture to modernizing the memorandum of understanding between the districts and the Department, so as to take into account the broader aspects of today's conservation effort.

Progress during the 1961 fiscal year in Service-assisted programs is summarized by specific activities:

Conservation Needs Inventory

One of the potentially most significant items of progress during the fiscal year was completion of the National Inventory of Soil and Water Conservation Needs. It provides county, State, and Federal private and governmental interests the best

and most complete information ever available on the Nation's privately owned land and water resources and the size of the soil and water conservation job ahead.

Although inventory figures still were subject to final checking and adjustments in some counties and States, many counties and a few States had refined and published, or were in the process of publishing, their inventory data by the fiscal-year end; and work was proceeding looking to early publication of the national inventory summary.

The soil survey, land-use, and land-capability data have been recorded on punch cards and identified so they can be compiled by any political subdivision, natural land-resource area, or watershed.

The inventory indicates that the acreage of non-Federal cropland, now about 640 million acres, will decrease by at least 2 percent, by 1975; pasture and range will increase 3 percent overall; and forest and woodland will decrease by about 2 percent.

The biggest net change is expected to be in land converted to urban and other nonagricultural uses. The more than 20 million acres that will go out of agriculture will be offset in part by about 5 million acres of new land coming into agriculture, making a net conversion of 15 million acres by 1975, or about 1⅓ million acres a year.

The inventory indicates that about two-thirds of the non-Federal land used for cropland, pasture, or woodland needs some kind of conservation treatment; while about one-third is adequately treated or, like the 40 million acres of Class I cropland, needs no special conservation practices. Soil erosion is the dominant problem on more than half the cropland.

Importantly, also, the conservation needs inventory delineated approximately 13,000 natural watersheds in the United States of sizes suitable for project development through the Watershed Protection and Flood Prevention Act and the Small Reclamation Projects Act. The inventory committees found that project action of some kind is needed in about 8,300 of these watersheds.

Soil Conservation Districts

Totaling an even 2,900 at the end of the fiscal year, soil conservation districts included 96 percent of the Nation's farms and 92½ percent of its land in farms, or 1,038,100,955 acres and more than 3,560,000 farms and ranches. Oklahoma, on January 17, 1961, was the latest of 23 States, Puerto Rico, and the Virgin Islands to be covered completely by districts since these local units of State government began organizing in 1937 under State enabling laws patterned for the most part after the model act suggested to the governors by the President. More than 1.8 million farmers and ranchers, operating about 594 million acres, were cooperating actively with their districts.

Soil Conservation Service aid to the districts likewise was stepped up in every way possible. This renewed effort was aimed at helping the districts to speed their agricultural resource betterment work so important to the Nation's economy and assurance of its ability to produce food and fiber in the amounts needed, when needed, for its added millions of people expected in the waning quarter of the 20th century and beyond, or in time of emergency.

The Service gave technical help to 2,883 districts during the year. It helped landowners and operators to develop 102,781 basic conservation plans on 36,906,598 acres, bringing the total of such plans to 1,358,290 covering 405,898,414 acres. Another 28,467 plans on 15,215,000 acres were revised and brought up to date.

In the interest of greater efficiency in their operations, small districts in some instances were consolidated during the year; and multiple-county districts in other cases were split into separate districts by individual counties. Twenty-five districts were involved in these realinements, and 26 entirely new districts were organized by farmers and ranchers during the year, for a net increase of 33.

Watershed Protection and Flood Prevention

***Watershed Protection (P. L. 566).*—As of June 30, 1961, a total of 1,505 applications for Federal assistance in developing projects including 106,558,000 acres under this act had been received by the Department of Agriculture from 48 States and Puerto Rico, including 186 applications from sponsoring local community organizations during the fiscal year. Meanwhile, 659 projects totaling 46,603,000 acres had been authorized for planning, including 93 approved during the year.**

Forty-eight projects were authorized to receive Federal technical help for planning and installing land-treatment measures and making engineering surveys and designs required in advance of construction. This brought the total projects approved for Federal assistance in the installation of works of improvement to 312. Of those, 204 had been authorized for the construction of structures called for in the watershed plans, 58 of them this year.

During the year, 239 floodwater-retarding structures were completed in P. L. 566 watershed projects, and 117 more were under construction on June 30. The total number of such structures completed by the year end was 471. Improvement work was finished on 156 miles of stream channels during the year, for a total completed to date of 339 miles. Land-treatment work progressed on all the small watersheds approved for structural work.

Watershed Protection (Pilot).—Only 20 of the 62 pilot watershed-protection projects originally approved for Federal assistance in 1953 remained to be completed at the end of the 1961 fiscal year. Projects completed totaled 35, and 7 had been terminated with concurrence of the local sponsors.

***Flood Prevention (11 Authorized Watersheds).*—Work plans were prepared for 12 subwatersheds and one subwatershed area covering 1,277,623 acres in fiscal year 1961. These brought to a total reported to date of 313 subwatershed and minor watershed work plans covering nearly 20 million acres. It was estimated that installations were completed as of June 30 on 106 subwatersheds and 29**

subwatershed areas that included approximately 3½ million acres. Conservation land treatment likewise was accelerated in these subwatersheds.

River-Basin Activities

River-basin investigations were started or continued on 14 major rivers during fiscal year 1961, in cooperation with the States involved and with other Federal agencies concerned with water storage, flood control, or navigation.

The Soil Conservation Service represented the Department on five Inter-Agency River Basin committees: Arkansas-White-Red, Missouri, Columbia, Pacific Southwest, and Northeastern (Resources Committee).

The Department of Agriculture continued its cooperation in river-basin surveys and investigations with other Federal or State agencies, with overall responsibility for these activities assigned to the Soil Conservation Service, one of the principal agencies of the Department concerned, along with the Economic Research Service and the Forest Service.

Investigations were under way during the year in these river basins:

Delaware River.—The Department is cooperating with the Corps of Engineers in a review of its reports. The survey has proceeded in accordance with a work plan developed by SCS, FS, and ERS representatives comprising a Field Advisory Committee. A Joint Engineering Work Group developed information on the storage potential and other features of possible reservoirs within the basin. The Department's participation in the cooperative survey was completed during the year.

Potomac River.—The Department is cooperating with the Corps of Engineers in a review of its reports on this basin. The Soil Conservation Service has developed information on storage potentials in small and intermediate size reservoirs for correlation with that on potentials for storage in large reservoirs developed by the Corps. Fieldwork on this survey is essentially completed.

Lower Mississippi River and Tributaries.—The Department cooperated with the Mississippi River Commission in a review of the Corps of Engineers' report. During the year, the Department completed a report on the agricultural potential of selected project areas in the Mississippi alluvial valley, utilizing data developed in the cooperative investigations; and the Mississippi River Commission completed the review survey report.

Yazoo-Mississippi River (Miss.).—The Department is cooperating with the Mississippi Board of Water Comissioners in a comprehensive survey of land- and water-resource development on approximately 6 million acres in the Yazoo-Mississippi flood plain and the bluff area in Mississippi. The objective of this survey is to obtain information to be used by the Department in identifying opportunities for P. L. 566 watershed projects.

Tombigbee River (Ala. and Miss.).—The Department also is cooperating with the Mississippi Board of Water Commissioners in a survey and investigation of this basin. Information developed is to be used by the Department to determine, among other things, opportunities for P. L. 566 watershed projects. The information will be used by the Board of Water Commissioners also.

Colorado River Storage Project.—The USDA Field Advisory Committee composed of representatives of the Economic Research Service, Forest Service, and Soil Conservation Service and the Land-Grant Colleges set up to coordinate the activities of departmental agencies and the colleges continued, in cooperation with the Department of the Interior, reappraising the direct agricultural benefits to be expected from the participating projects of the Colorado River Storage Project. The project reports also provide information on the relationship between project facilities and adjacent watershed lands and the impact of the various projects on national forest lands and improvements.

Fieldwork has been completed on the Silt Project in Colorado and on the Emery Project in Utah; and is under way on the Lyman Project in Wyoming; and reports are being prepared. Work has been discontinued on the Central Utah Project.

Cape Fear River (N. C.).—The Department continued cooperation with the Corps of Engineers and the State of North Carolina in a survey of the Cape Fear (including the Haw) River Basin in developing alternate plans for the reduction of floodwater and sediment damages and the utilization of its water and related land resources. A joint report, completed and submitted to members of Congress concerned, presented two alternative methods for the development of the water resources of the basin for agricultural, industrial, municipal, recreational, and other uses.

Upper Mississippi River and Great Lakes Basin Areas.—The Soil Conservation Service is cooperating with various field offices of the Corps of Engineers in the Upper Mississippi River and Great Lakes Basin areas to determine the effect upon agricultural lands and crops of proposed major drainage projects of the Corps of Engineers. Project reports were completed during the year on the Lookingglass River in Michigan and on Hog Creek in Ohio; and survey work is under way on others.

Upper Willamette and Deschutes River (Oreg.).—The Department continued cooperating with the Oregon State Water Resources Board in a water-resources survey and investigation of these basins to obtain information with a view to the coordinated development of their water resources. This survey also will provide information for assisting local organizations in developments under the Watershed Protection and Flood Prevention Act, about opportunities for development of water on national forests as a part of multiple-purpose development of the natural forest resources; and as a basis for providing technical help to farmers and ranchers. The draft reports on these surveys have been prepared.

Bayou Bartholomew (Ark., and La.). The Department continued its cooperation with the Corps of Engineers in a survey of this basin, particularly of the hill section. The general objective of the upland survey was to formulate a watershed-treatment program, including systems of floodwater-retarding structures. The Department's report on this survey has been completed.

Humboldt River (Nev.).—The Department likewise continued cooperating with the Nevada Department of Conservation and Natural Resources in a comprehensive survey to provide a basis for planning and developing this basin's water and related land resources. A draft report on the survey of the Little Humboldt River sub-basin has been prepared, and substantial progress was made on the Pine Valley sub-basin survey.

Arkansas River Multiple-Purpose Project (Ark. and Okla.).—The Department also continued cooperating with the Corps of Engineers in a survey to develop information on the effects that project works of the authorized Arkansas River Navigation Project may have on lands adjacent to the Arkansas and Verdigris Rivers.

Sevier River (Utah).—The Department's cooperation continued with the State of Utah in a comprehensive survey of the water and related land resources of this basin. The State of Utah and the Sevier River water users need information on the possibilities for solving some of the complex land and water problems of the basin.

Gunnison River (Colo.).—The Department is cooperating with the Colorado Water Conservation Board in a comprehensive survey to provide a basis for planning and developing the water and related land resources of this basin. A work plan for the cooperative survey has been prepared, and initial survey activities have begun.

Soil Conservation Service representatives continued to serve as Department advisers to Federal members of various

commissions negotiating inter-State compacts.

Great Plains Conservation Program

Out of 422 counties authorized to participate in this program, 361 counties in the 10-State area had been so designated by June 30, 1961. In addition to the 6,947 cost-sharing contracts covering 18,082,351 acres which had been signed by farmers and ranchers by the fiscal-year end, there were 2,927 applications covering 9,145,000 acres on hand.

Farmers and ranchers signed 2,217 contracts under the program during the 1961 fiscal year. These contracts cover 5,302,685 acres, and are aimed at stabilizing the participating operating units through better land use and the application of enduring conservation measures with the help of long-term cost-sharing where needed. A total of 3,118 applications were received for assistance on 7,182,004 acres during the 1961 fiscal year.

A total of 607,964 acres, or 28.3 percent of all the cropland on participants' farms or ranches, had been planned for conversion to permanent vegetation since the beginning of the program, most of it under program plans. Planned land-use conversion during the year totaled 163,392 acres, or 27.4 percent of the participants' cropland. The 88,496 acres of rangeland planned for reseeding during the fiscal year brought the total for this major practice to 557,447 acres since the start of the program. Other cost-sharing practices include terracing, stockwater ponds and wells, stripcropping, tree windbreaks, water spreading, and other measures needed for developing basic conservation plans.

The Great Plains Conservation Program continued to draw the attention of soil and water conservation disricts and other interests elsewhere in the country, because of its basic feature of being tailored to fit the specific needs of an area having common climatic, erosion, and other problems, thereby setting a pattern potentially applicable in other areas.

Soil Surveys

Soil surveys are first in order among the technical facilities which the Soil Conservation Service provides to landowners and operators through the soil conservation district and other programs in which it has responsibilities. These surveys are basic to all of its conservation planning, which in turn results in the blueprints for soil and water conservation land treatment and water management.

Requests for information about use of soil maps in urban planning and construction work continued to increase during the last year. Requests also continued for guidance in the use of soil maps and reports for tax-assessment purposes. Public demand for soil survey information was spurred further as a result of initial availability of the conservation needs inventory information. Soil survey information, aside from its primary usefulness to farmers and ranchers, is a particularly valuable tool for use in county or community planning, and for other purposes.

***Soil Survey Operations.*—Soil surveys were made on more than 55,750,000 acres during the 1961 fiscal year, compared to approximately 50,160,000 acres the year before, an increase of 11 percent.**

More than 700,563,000 acres had been suveyed and mapped by June 30 in enough detail for soil and water conservation planning of farms and ranches and small-watershed projects. The mapped acreage represents about 37 percent of the country's total land area.

Of particular note the last year were the number of States that had completed conversion of soil conservation surveys to standard soil surveys. Standard soil surveys are being made in 1,885 areas, of which 830 are being mapped progressively. Procedures also were developed for making standard soil surveys of extensive grassland areas, for use in ranch planning.

The soil survey always has been a cooperative undertaking with the Land-Grant Colleges. This cooperation has continued to expand; and the Soil Conservation Service now is cooperating with the Forest Service, Bureau of Indian Affairs, Bureau of Reclamation, and the Bureau of Land Management. In addition, the need for soil maps and interpretations by local planning groups is so great that they are making money available to the Service for soil maps and interpretations and, in some cases, for specific data normally not collected in a soil survey.

***Soil Classification and Correlation.*—**The number of established and tentative soil series in the United States still stood at nearly 7,000 at the close of the last fiscal year. A total of 194 tentative series were proposed; 119 series were established; 111 tentative series were dropped after testing; and 42 series established earlier went onto the inactive list because of conflicts with other series.

A total of 146 initial field reviews were completed during the year, many of them representing conversions of conservation surveys to standard surveys.

Work on a revised nationwide system of soil classification was continued, with publication of the 7th Approximation of a comprehensive system of classification. Further trials in the grouping of series in families, groups, and subgroups in the 7th Approximation also were made.

Several joint field studies with principal soil correlators, State soil scientists, and others were made in parts of States or along common boundaries of two or more States. These studies are designed to improve the definition of soil series, the characterization of soils, and interstate correlations.

***Soil Survey Interpretation.*—**Thirty-seven edited soil survey reports, with maps, were sent to the Government Printing Office during the fiscal year. These, with 16 other soil survey reports at the plant, made a total of 53 in the Government Printing Office awaiting publication. Meanwhile, 36 soil survey reports and maps were published. Approximately 90 soil surveys were in various stages of soil correlation and report manuscript preparation as of June 30.

Nearly all manuscripts now contain engineering interpretations, and most of them include groupings of soils into woodland suitability groups or range sites, or both.

Several contain such other groupings or interpretations as those for suburban uses, sewage disposal, special irrigation groupings, or wildlife interpretations. More soil interpretation and descriptions of soils for nontechnical readers increase the value and use of published soil surveys.

Work progressed satisfactorily in the development of criteria and procedures for using climatic data in making soil interpretations and in the placement of soils in capability and other interpretative groupings.

***Soil Survey Investigations.*—**A new, comprehensive system of soil classification was published in preliminary form for distribution at the Seventh Congress of the International Soil Science Society. It is applicable not only to the soils of the United States but to those of the rest of the world. It is hoped that its use will

facilitate application of knowledge gained throughout the world to problems of soil use in this country.

Studies of world-wide distribution of radio-active fallout were continued for the Atomic Energy Commission. Results of the studies to last June 30, which showed that the bulk of the stronium 90 had fallen out of the atmosphere by that time, were published jointly with the U.S. Weather Bureau.

Cartography.—Increased emphasis on the small-watershed protection and flood-prevention program during the 1961 fiscal year was one important item resulting in a greater need for cartographic assistance. Continued emphasis was placed on the need for producing a greater quantity of soil maps of high quality. Soil maps for 13 counties and projects were completed during the year and made ready for the printer; and printed soil maps were finished and distributed for 37 counties and projects. In addition, mapping operations on 150 other counties and projects were in some stage of work.

Production of farm and ranch plan maps continued to require a major part of the Service's cartographic resources. This work is given high priority, with the maps produced and delivered to the field without delay. A total of 409,503 prints of soil and capability maps for 150,699 farms and ranches were produced. Conservation plan base maps involving 503,849 prints were produced for 178,361 farms and ranches.

The Cartographic Division processed 6,875 film packs and produced 389,032 contact prints and enlargements for the States during the year. Outstanding color photographs were taken by the documentary photographers for the soil survey exhibit at the International Soil Congress and for the "Water for America" series in preparation at the fiscal-year end.

Specifications were written and contracts awarded for eight special-purpose aerial surveys, all but two of which had been completed, and one standard 1:20,000 aerial survey.

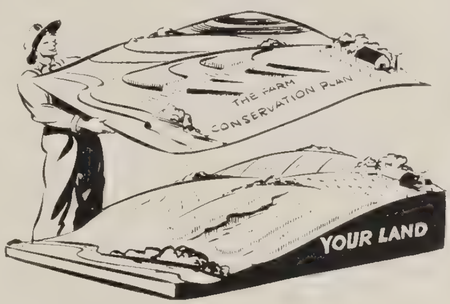
Increased lithographic production of maps and related materials was reported by virtually all units.

Farm and Ranch Planning

On Farms and Ranches.—Farm and ranch planning is basic to any sound conservation treatment and management of farm or watershed lands. The rapidly changing agricultural conditions under which farmers and ranchers operate make it absolutely necessary that we who are assigned responsibility for helping them apply their conservation systems keep our technology up to date. We accomplish this by keeping our work unit technical guides under continuing review and revising them as new technology develops.

Soil conservation district cooperators developed 102,781 basic conservation plans during the 1961 fiscal year, covering more than 36 million acres. This was an increase of about 4 percent over the preceding year's plans. In addition, 28,467 basic plans, for more than 15 million acres, were revised and brought up to date. At the end of the year, 1,358,290 farms and ranches, involving more than 405 million acres, had the benefit of such basic soil and water conservation plans; and 213,298 of these basic plans had been fully applied.

On Nonagricultural Land.—Some of the worst erosion and siltation problems occur on nonagricultural land. It therefore is not surprising that the number of requests coming to the Service for help on such land continues to grow, particularly in soil conservation districts near expanding population centers.



Although the Service is in the best position to provide nonagricultural landowners and users with technical advice, its primary obligation is to assist soil conservation districts, and it does not take unilateral action on requests for help on nonagricultural lands.

Instead, the Service asks the districts concerned to establish appropriate priorities for servicing such requests. Then, to the extent possible, the aid given is (1) restricted to consultation, (2) covered by an agreement between the soil conservation district and the landowner, and (3) provided through boards, commissions, and committees or associations and groups of owners.

Increasingly wide use of the information developed by the needs inventory will be made by Service technicians, both those working with landowners and operators in rural areas and those in metropolitan areas.

Land Treatment

All possible emphasis continued to be placed on helping soil conservation district farmers and ranchers to apply conservation practices to the land in accordance with a basic plan, as part of a coordinated land-treatment program as specified in the plan. Special efforts also were made to speed up the conservation treatment of land in all small watersheds approved for structural works of improvement.

Some of the major conservation practices applied by district cooperators with SCS technical assistance during the year include:

More than 13.9 million acres of conservation cropping systems; 3¼ million acres of contour farming; 4⅓ million acres of cover cropping; 12.9 million acres of crop residue use; 658,500 acres of stripcropping.

Also, 3¾ million acres of pasture improvement; 2¼ million acres of pasture planting; 3⅓ million acres of rotation grazing and 15½ million acres of deferred grazing; 41 million acres of proper range use; and 902,000 acres of range seeding.

Also, 708,000 acres of tree planting, including farmstead windbreaks; nearly 1¾ million acres of woodland improvement, and more than 3¾ million acres of woodland protection; and 437,000 acres of wildlife area treatment.

Also, 56,000 acres of grassed waterways; 55,670 farm ponds built; 42,850 miles of terracing; 279,000 acres of land grading and smoothing; 2.1 million acres of improved irrigation water application; and 1.6 million acres of drainage improvements.

The significant progress in application of conservation on the land during the year is reflected in the fact that 15 of these 20 measures showed increases over the year before, most of them in most substantial amounts.

Group job measures installed in fiscal year 1961, benefiting about 27,680 farms and 1.8 million acres, included 170 miles of irrigation canals and laterals built; 1,500 miles of ditch channels constructed, or improved; 151 miles of stream-channel improvement and 23 miles of streambank protection; and 1.6 million cubic yards of spoil-bank spreading.

Plant Technology

The past year saw continued progress in the various phases of conservation planning and accomplishment that deal with the use of vegetation and its management. The following examples illustrate this:

Soil-Loss Predictions for Wind Erosion Areas.—Research data on soil losses from wind action became available in sufficient detail that Service agronomists in the Great Plains States during the past year were able to develop specifications for wind erosion control comparable to those for water erosion control. This provided work unit conservationists with

several alternatives for advising farmers on combinations of wind-strip width in relation to amounts of residue to be left on the surface for soil protection. Guides also were developed for use of proper tillage equipment related to the suggested techniques.

More Use of Stubble.—High winds caused considerable damage to unprotected fields in some parts of the Great Plains during the spring of 1961, but there was little or no damage where farmers followed Service specifications for stubble mulching.

Consequently, there were more good stubble-mulched fields in the Great Plains this past year than ever before. One State reported an increase of 80 percent last spring as compared to 1958. This increase attests to the fact that the work unit staffs now are equipped to advise farmers on proper methods, and that there has been a concerted effort at all levels of the Service to encourage stubble mulching.

Meanwhile, mulch planting, a practice that has been in a trial stage in South Carolina and Georgia was tried during the year by farmers in other southeastern States. The practice embodies the principles of minimum tillage by planting row crops, such as soybeans or corn, in the previous crop stubble without prior seedbed preparation. It has proved to be an excellent erosion-control measure when performed on the contour; and when it is used with terraces or contour stripcropping, soil and water losses are further reduced. Yields are maintained, and the cost of production is reduced as much as $8 to $10 an acre.

Fish and Wildlife Enhancement in Small-Watershed Projects.—Plans for fish and wildlife enhancement increased materially in watershed work plans. In the Northeastern States, for example, there now are approximately 30 such enhancements in various stages of development. These include trout-stream improvement and fish and wildlife developments, including waterfowl marshes and fishing waters.

In Pennsylvania, preparations are under way for the development of a master plan for fish and wildlife resources involving six neighboring watersheds and a State and a Federal waterfowl refuge. A single watershed project in Utah, the Sanpete, includes 535 acres of waterfowl-marsh development, 150 acres of new fisheries, and 4,300 acres of winter range for big game. Similar achievements were made in several other regions.

Woodland Conservation in Soil Survey Reports.—Far greater accomplishments in the interpretations of soil survey information for the growth of trees and production of wood crops have been evident in recently published soil survey reports than ever before. Field specialists in woodland conservation, working with soil scientists, have grouped soils into woodland suitability groupings and developed ratings of the soils in each group in terms of their suitabilities for use and treatments needed for optimum production of wood crops.

Woodland suitability groupings have provided a basis for the simplification of prescribed treatments for both protection of soil and water resources and the use of trees for the economic advantage of landowners and operators.

Better Plants for Soil and Water Conservation.—In the Southeast, a wild reseeding soybean, found in eastern Tennessee, was tested in North Carolina for its use by wildlife. East India bristlegrass (Setaria barbata), evaluated at the Arcadia, Fla., Plant Materials Center, was found to be especially shade tolerant in orange groves.

In the Northeast, the Big Flats, N.Y., Center selected several promising accessions for increase to provide sufficient seed for field evaluation. Among them were big trefoil; a vigorous strain of deertongue selected in New York that shows promise for use on sand blows and other infertile sites; a leafy selection of switchgrass from New York that tolerates wet and droughty sites; an erect, thick-stemmed ecotype of switchgrass that withstands snow and remains erect over winter, of potential value for pheasant and rabbit cover; and a low-growing, dense form of timothy that seems promising for waterways.

In the Cornbelt, a superior selection of Crownvetch was widely tested and released as Emerald Crownvetch, in cooperation with Iowa State University. Medium purple willow gained wider acceptance in protective windbreak plantings in truck gardens on Michigan muck lands; while in Kentucky and Missouri, it was found useful in stabilizing gullies and for controlling steep banks. Amur bush honeysuckle was developed at the Elsberry, Mo., Center and proved useful for winter wildlife food and cover in several Cornbelt States.

In the Great Plains, a selection of tall wheatgrass, named Largo and originated at the Los Lunas, N. Mex., Center, was released for certification by the Colorado Crop Improvement Association, because it proved superior to other strains on wet alkali sites. Seed of Greenville switchgrass, also from Los Lunas, proved especially well suited for range reseeding in the 16-inch rainfall area where other strains had failed.

In the West, Lana Vetch, released in 1957 by the Pleasanton, Calif., Center, gained a reputation for its versatility and reliability for range forage, bank stabilization in watershed projects, cover and green manure, and for wildlife food and cover. A strain of hard fescue developed at the Pullman, Wash., Center was certified by the Crop Improved Associations in Washington, Idaho, and Oregon.

The National Plant Materials Center.—Approximately 750 accessions were added to the list of possible conservation plants for evaluation, small-scale increase, and further distribution from the National Center at Beltsville, Md. The new plant materials assembled at this Center came from 45 countries. In return, requests for materials came to the Service from 27 countries.

Range Improvement on Sandy Lands in the Southern Great Plains.—More and more ranchers dramatically increased the productivity of sandy rangelands in the southern Great Plains. On tens of thousands of acres, a combination of brush control and deferred grazing has increased forage production remarkably. Range improvement on such land is taking place in west Texas, western Oklahoma, eastern New Mexico, northeastern Colorado, and southwestern Kansas.

In many instances, such rangelands have changed from brush to grass in 2 to 4 years, increasing production of perennial grass in some cases from several hundred pounds to more than 3,000 pounds of air-dry herbage to the acre.

Engineering

Special emphasis during the last fiscal year was put on increasing technical engineering efficiency in order to keep abreast of still sharply mounting watershed-project and other demands for this type of Service help and advice. Specific goals of giving the soundest available direction to all engineering aspects of the Service's participation in watershed, soil conservation district, and other programs include the assurance of having sound construction and getting full return for Federal and all other money invested in them.

Watershed project dams, for example, serving many people in the community and oftentimes involving municipal, recreational, or other purposes, are larger than those on individual farms. They accordingly require more complex engineering, from more extensive hydrological and geological investigations of sites to more complex structural designs. The Service therefore seeks to provide its engineers on the job, who are responsible for design and construction, with the most practical and helpful engineering guidelines possible.

Erosion-Control Practices.—Constantly improved guides for structural erosion-control measures also have been stressed. Thus there was continued improvement during the year in the design and installation of terrace systems adaptable to modern farm equipment. A part of

this improvement was increased acceptance by farmers of the idea of smoothing and leveling field surfaces in advance of terrace construction.

Irrigation.—Interest in P. L. 566 small-watershed projects involving irrigation work continued to increase. Many of the watersheds seem to pose new problems that involve the development of new analytical procedures.

Two successive years of short water supplies in parts of the West have increased interest in improving irrigation water-management practices, and all of the Western States are putting increased emphasis on this work. Good progress also was made in working with operators of the large sugar plantations in Hawaii on irrigation water management.

Substantial time and effort were put into the "National Standards for Irrigation Practices." These now are essentially completed and will aid materially to incorporate more uniformity and better engineering into all of the Service's irrigation fieldwork. There has been increasing interest on the part of the U. S. Bureau of Reclamation in obtaining more advanced technical resource information from the Soil Conservation Service, to assure efficient use of water in new projects.

Drainage.—There was a significant increase in requests for assistance of drainage engineers in P. L. 566 watershed planning and operations. This was because of an increase in the number of projects involving land drainage. Help was provided with the design of several large pumping plants to be installed in such projects. Interest has increased in tile drainage of citrus orchards in Florida.

Continued progress was made in preparing adequate drainage guides, especially in adapting them to drainage in irrigated areas. National standards were developed for four of the most important drainage practices and submitted for review. Interest has continued in drainage of woodlands in the Southeast.

Water-Supply Forecasting.—Snowfall during the 1960-61 winter season was extremely deficient over a wide area of Arizona, California, Nevada, Utah, and Wyoming, and extended into southern Idaho and southeastern Oregon. It was the third year of drought in some of these areas. Irrigation reservoir storages have been depleted.

A major effort was undertaken well in advance of the irrigation season to warn farm and other water users of the impending shortage, through issuance of special snow survey reports and advisory notices or brochures on irrigation water management. The water-supply forecasts also were used by Federal and State Governments in determining allocation of funds and taking other actions to alleviate 1961 drought effects. Several specialized forecasts also have been developed.

An economic study of the value of forecasts was made for the 1960 season on the Salmon Falls Tract in Idaho. It showed a saving of about \$300,000 on 31,000 irrigated acres as a result of actions taken by farmers based on water-supply forecasts. The cost of surveys in this area was only about \$2,000.

Hydrology.—The most significant increase in the hydrologic aspects of Service work was in interagency cooperation on water-resource development. Service hydrologists, to illustrate, participated in several river-basin studies and in activities of various interagency and other water-resources committees.

Cooperative projects of the Service and other Federal agencies continued to provide more hydrologic data and improve hydrologic techniques. A computer program also has been developed in cooperation with a private data processing firm, to develop probability curves of streamflow for varying durations.

Geology.—Further progress was made in improving the overall aspects of geologic studies. Emphasis on improvement of investigational procedures has resulted in more efficient collection of pertinent geologic information on dam sites. Considerable attention also has been given to the channel stability and sediment-transport problem.

Design and Construction.—Because the size and complexity of watershed engineering continues to increase, it has become necessary to review some of the existing design criteria and to reconsider the effect of increased duration and frequency of flow through earth spillways.

Definite progress has been made in development of design procedures, tools, and criteria for open channels.

Decentralization of Service soil-testing operations continues, with testing done the past year by the Soil Mechanics Laboratory at Lincoln, Nebr., and by the materials testing sections in the Engineering and Watershed Planning Units at Spartanburg, S.C., Forth Worth, Tex., and Portland, Oreg.

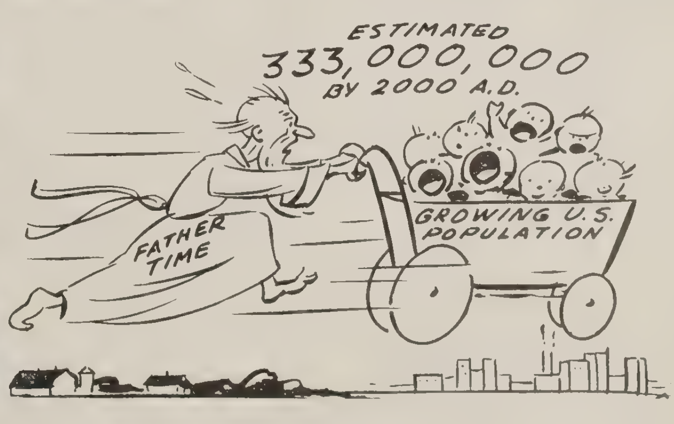
Other Programs

The Soil Conservation Service continued to assist Agricultural Conservation Program participants with permanent-type practices on which cost-sharing was requested. This service was given in approximately 337,000 cases, affecting 314,223 farms and ranches, about 218,218 of which were soil conservation district cooperators.

The Service also provided technical assistance to several hundred participants remaining active the first part of the fiscal year in the subsequently terminated Conservation Reserve Program of the Soil Bank during the year.

It also gave special direct soil survey and farm planning assistance to farmers in Rural Development areas where special funds had been allotted. Later in the year, it joined with other Department agencies in State and local Rural Areas Development planning, through committees and panels being organized for carrying forward an expanded program of rural area improvement in designated counties throughout the country. This activity promised also to call for stepped-up soil survey work and conservation farm planning in the future, in addition to regular technical help given to soil conservation district coooperators.

Also continued was Service help to the Farmers Home Administration in its conservation and watershed loan programs.



REVIEW

MEGALOPOLIS the Urbanized Northeastern Seaboard of the United States. By Jean Gottmann. 810 pp. Illus. 1961. Twentieth Century Fund: New York, N. Y. $10.00.

"Megalopolis" is a well-written discussion of the social, economic, and political conditions that led to the development of the dominantly urban and suburban 30- to 100-mile wide strip extending along the Atlantic seacoast from southern New Hampshire into Virginia.

The first section of the book discusses the establishment and growth of the 117-county area in 10 States in relation to its geography, topography, and climate. It draws upon, among other documentation, soils and land-capability maps based in part on Soil Conservation Service data. Although this vast megalopolis comprises less than 2 percent of the country's area, it contains more than 20 percent of the population.

Paradoxically, about half of the area is wooded, and in 1950 it produced more than 5 percent of the total value of agricultural products sold in the United States. It thus is, in effect, a huge laboratory in which the processes and results of rurbanization can be observed.

Of special interest is the second section, on land use, followed by two sections dealing, respectively, with largely urban problems and developments, with present conditions and trends, and with actions taken to insure permanence and progress instead of decay.

The chapter on agricultural use of land is a summary of a report by Prof. Edward Higbee of the University of Delaware, after an extensive study of the subject. The author points out that, because of high land values, proximity to markets, and the tempered maritime climate, the area's intensive agriculture consists largely of producing highly perishable market-garden crops and milk and poultry products.

But there is a constant decline in farmland acreage as it passes into urban uses, though the shift is offset in part by increased per acre production, of mostly perishable products. As good cropland is taken over for urban development it is replaced by inferior land, either on the same farm or farther from the cities. The author, who drew upon some material from the recently completed National Inventory of Soil and Water Conservation Needs, makes the point that "land that is not considered cropland today will become cropland, but at the price of much investment" to improve it. He finds that zoning to keep good land in agriculture does not appeal to the many farmers who are thinking of the capital gain to be made when their acres are sold at city prices.

These trends do not mean, however, that agriculture will become extinct in megalopolis. Some farmers will retain their best land, and, by increased use of fertilizers and irrigation, increase production per acre. Others will introduce specialty crops, such as Christmas trees, on the poorer land. Dairymen and poultrymen will find improved methods for using foodstuffs from outside the region. But, as the author emphasizes, proper land planning according to land capabilities is needed, for both agricultural and urban uses.

One chapter treats the apparent trends and the types of forest that are adapated in megalopolis, as well as the need for proper management practices, including those for recreation. The value of forested areas for water supply and flood protection also is stressed.

"Megalopolis" is a most readable, interesting, attractive, and instructive book. It should be a valuable tool in the hands of anyone dealing with rurbanization, from either the rural or the urban approach to its problems.

—Henry R. Adams

MARCH 1962

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

VOL. XXVII, NO. 8 MARCH 1962

Growth Through Agricultural Progress

We are omitting quotations on terracing and such from the comparable issue of 25 years ago to salute the farmer-organized and managed soil and water conservation districts this month on their silver anniversary.

Arkansas, on March 3, 1937, was the first of 50 States, Puerto Rico, and the Virgin Islands to enact district enabling acts—22 of them that same year. The first district (Brown Creek in Anson and Union counties, N. C.) was voted into being on August 4, 1937. By 1962, more than 2,900 such local democratic units of State government include 92½ percent of the Nation's farmland and 96 percent of its farms. Alabama, in 1941, was first to be covered completely by districts.

The districts' subsequent leadership and accomplishments in basic outdoor conservation and use make the SCS proud to be directed by Congress and the Secretary of Agriculture to make its technical and other services available principally through these districts.

—The Editor

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Cover Picture—Outdoor beauty and enjoyment at their best at the Carolina Trout Pond on the Carolina State Reservation at Richmond, R. I.

Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

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FRANK B. HARPER, Editor

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Soil and Water Conservation Basic To Outdoor Preservation

By Donald A. Williams

SOIL and water conservation are basic to preservation of our whole out of doors.

The outdoors is made up of land and water and the plant and animal life they support. Concern over outdoor preservation has mounted in the wake of rapidly growing population pressures. The best attainable land use and water management are essential to maintain land space and clean water to meet the multiple demands for farming, for wildlife and recreation, and for urban, industrial highway, and other essential purposes.

In land, and water, man can destroy something he has not the power to create. In land and water he can alter or modify, for better or for worse, those resources upon which he is totally dependent. This power we have to build or to undermine, or even destroy, our heritage of land and water resources lays a special responsibility upon every one of us, whether we dwell in the countryside or within corporate limits or suburbs.

While we drive on in the exploration of outer space, we cannot gainsay the fact that our own Mother Earth's thin covering of productive soil will remain for a long, long time as our principal source of food and fiber, our sports and recreation, and our everyday satisfying living. We have learned, however, that land is more than soil, and that soil is more than a medium for growing crops. We know that sun, air, rain, soil, plants, animals, and man all are linked together in a chain of interdependence. Land, we know, is the indispensable base of all of these elements of existence.

Land means many things to different people. For the first century of American settlement, our economic development was based largely upon exploitation of the new-found continent's soil, timber, wildlife, and mineral resources. Today, however, our land has taken on totally new values. These include the productive source of our food and other living essentials, watershed areas subscribing community stability and well-being, recreational space and wildlife habitat, wilderness or other unspoiled natural areas for the reflection and enjoyment of our Nation's citizens, and living and industrial working space for 185¾ million people who are increasing their numbers by some 3 million each year.

It is fundamental to our democratic system, as well as to an orderly approach to conservation and wise use of our land and water resources, that people exercise their inherent right to decide how they wish to use these resources. Land uses do not have to be exploitive. They can be in full harmony with the public interest, and with the capabilities of the land.

The fact that there are uses of land in sharp competition with one another further complicates an already complex relationship which we need to understand more fully. The solution lies in closer cooperation between such groups as farmers' soil conservation districts and county, city, or other planning organizations. It calls for more and more attention by urban people to what is happening on the farmlands that surround the city.

In this dynamic age—this age of space exploration and exploding population—we must not forget the fundamentals of conservation that underlie good land use and conservation. They include use of full facts about soil, water, plants, and people, and the interrelationship between them as a basis for land and water management. They relate to the need for proper combinations of treatments and uses encompassing the sciences of soils, agronomy, forestry and ecology, biology, hydrology and hydraulics, economics, and others that are interwoven into what we recognize today as soil and water conservation technology.

Most importantly, they include the principles of human interests and needs—recognition of the fact that the people who use the land, whether for farming, hunting and fishing, or camping, are the key to its future fate. One of our great needs today and in the future is to apply on all lands—farm and pasture lands, forest lands, wildlife and other recreational lands—the same basic principles that have proved sound in more than a quarter of a century's experience in soil and water conservation.

Therein we have the best assurance of the maximum possible preservation and future enjoyment of all our out-of-doors.

People Make Lakes "Grow Old"

Conservation Rejuvenates Them

By Nils P. Dahlstrand

LITTLE St. Germain Lake in northern Wisconsin's Vilas County vacationland has started to show the effects of old age. The cause is people, more people, and still more people!

Take a lake today, build a few access roads and paths, cut trees and clear areas for cottages, clean up the debris, and install septic tanks—and you've taken a hundred years off of its life. But then raise and lower the water level periodically, fish almost continually for the walleye, bass, or prized musky, clear the shoreline for bathing beaches, churn up the water with power boats—and this same lake becomes "prematurely gray."

The Paul Meyers' beach on Crawling Stone Lake. The beach line originally was at the stones at the base of the birch trees.

Geologists say a lake is but a temporary feature of the landscape, even under natural conditions. The thousands of swamps in northern Wisconsin attest to this fact. These swamps, once filled with cool, clear water, have gradually filled up with dead vegetation. It may have taken a few thousand years, but the lakes are gone while the surrounding hills remain.

When human "improvements" are made upon Nature's liquid gems, the aging process is speeded up. Soil washing starts along the paths and slopes to the lake, wave erosion chews at the beaches, and weeds and algae take over where the water was clear before.

Property owners on Little St. Germain Lake, which is typical of thousands of lakes, became concerned about the fate of their lake and have taken steps to do something about it. Through their lake improvement association, they took a hard look at their problems and decided upon an attack using modern soil conservation methods to reduce erosion and silting. In addition to erosion problems confronting the committees, there were such other problems as algae, weeds, fish propagation, safety, wildlife, lake property improvement, and sanitation.

To check soil erosion, property owners enlisted help of the Vilas County Soil Conservation District and the assisting Soil Conservation Service. Intensive use of shorelines oftentimes leaves the soil wide open to erosion. Association President George Jackson has a good example of what erosion can do—a newly formed weedbed at the end of his dock.

Note:—The author is work unit conservationist, Soil Conservation Service, Rhinelander, Wis.

"Runoff water from heavy rains used to wash out my boat access road leading down to the lake," he recalled. "Soil from the road was washed into the lake next to the dock, leaving the water muddy for a day or so after each heavy rain. Soil particles settled to the bottom and gradually formed a seedbed for water weeds to grow."

The weedbed, about 40 feet across and 30 feet from the shore, was like an island surrounded by a weed-free, sandy shoreline. Jackson built a diversion terrace, which acts as an eave trough to stop the erosion, catching the runoff water above the beach and leading it aside to a grassy area where it

Chief St. Germain statue—20-feet tall—looks down upon officers and directors of Little St. Germain Lake Improvement Association. (L to r., front: George Jackson, pres.; Martin Pietz, pres.-elect; rear: Ray Ramminger, Sam Glick, secy., Cecil Ray, Art Alexander, and Fred Stutz, treas.)

Ray Ramminger and son, David, on steps that serve as drop spillway to lower storm runoff water to lake level without eroding the soil.

empties into the lake. The boat access road won't wash out again!

Said resort owner Ray Ramminger:

"Our association has a lot to do, and we're just getting started. This lake doesn't belong to us, but since we own the land around it, it's up to us to take care of it. We're trying to do as much as we can ourselves, but we also want all the help we can get."

He and the association are drawing upon the help of different agencies—the Wisconsin Conservation Department, the State Extension Service, the local soil conservation district, and the Soil Conservation Service.

Ramminger is convinced that all the interrelated problems—fish, weeds, algae, erosion, and others—have to be attacked simultaneously.

"These organizations work mostly with farmers in other counties," he pointed out. "But we're farmers,' too, in a way. That lake out there is our farm. The crops are fishing, boating, swimming, and water skiing. And the land around it yields crops, too—deer, ruffed grouse, and northwoods beauty."

He feels that erosion problems are just as serious here as they are on high-priced farmland.

Resort owner Cecil Ray, raised on an Indiana farm, used familiar tile drainage to tap a seepy area next to one of his cottages.

"The foundation used to heave every year, and it was always wet around the cottage," he said. "Now she's dry as a bone, and more sanitary, too."

Many other lakes in the State are having the same troubles as those of Little St. Germain Lake. For example, on Crawling Stone Lake in southwestern Vilas County, the Paul Meyers licked their resort erosion problems by seeding grass on bare slopes above their beach, changing them to green carpets, and cutting down silting along the beach.

Their problem now is to maintain their beach against wave erosion. High water, strong winds, and fast-moving power boats direct a powerful force against the sandy beach. Even on calm days, the power boats alone can throw up waves equivalent to those generated by a 20-mile-per-hour wind. The answer to this serious problem, common to many lakes, hasn't been found, but the Meyers and many others are working on it. Meanwhile, more and more people in the recreational areas of Wisconsin are looking to modern soil conservation measures as a means to solving their soil and water problems.

Herring Bailed Out George Washington

Herring fishing is reported by the National Geographic Society as more than once having spelled the difference between profit and loss for George Washington's farming operations at Mount Vernon south of the Nation's capital.

In 1769, for example, the Society reported, a Virginia crop failure was offset by the sale of salted herring. As late as 1796, when he was president, Washington wrote to his estate manager: "I wish, as your prospect for grain is discouraging, that it may, in a degree, be made up in a good fishing season for herrings."

Salted and packed in barrels, herring was easy to ship to ready markets, the Society reported, adding that vast schools of the silvery fish flashed up the Potomac River past Mount Vernon every spring. Though Washington called them herring, they actually were alewives, a close relative. Alewives and shad still run up the historic river in the spring, and about 25 million pounds are netted in the Chesapeake Bay region.

Although, on becoming president, Washington was perforce an absentee landlord, he complained to his manager about damaged herring seines. As the herring season approached, Washington, an experienced fisherman, wrote his manager that fishing would be unproductive unless the weather grew warmer. He warned the manager to "secure a sufficiency of fish for the use of my own people from the first that comes, otherwise they may be left in the lurch."

He also kept up to date on market prices!

Young Campers Learn About Outdoor Conservation

By P. H. Bedanbaugh

EACH year in early June about 100 selected South Carolina boys and girls of early high school age prepare to attend a special week-long camp designed to teach them about the State's natural resources and the need for conserving them.

The South Carolina State Conservation Camp is sponsored by Garden Club chapters, Wildlife Federation chapters, and other conservation-minded organizations. As the importance of conservation knowledge is more widely realized, more and more organizations every year contribute to the funds to sponsor the campers.

The camp is held at Camp Forest in Cheraw State Park, where the soil, water, forests, and wildlife provide the laboratory and study materials for many of the class sessions, in which actual examples of conservation and the lack of conservation are studied, compared, and measured.

All the State resource agencies cooperate by providing teaching personnel to bring the latest management practices before the campers. Gordan H. Brown, education assistant with the South Carolina Wildlife Resources Department, coordinates the program and serves as camp director. Classes in soils and soil and water conservation are taught by P. H. Bedenbaugh, soil conservationist of the Soil Conservation Service assigned to the Chesterfield Soil Conservation District, the supervisors and cooperators of which have helped with the camp program.

SCD Supervisor Campbell McLeod of McBee, S. C., prepares an irrigation demonstration for State Conservation Camp boys and girls in McLeod orchard.

The campers learn how to identify soils and the land-use treatment for different soils and land-capability classes, and what soils contribute to plant growth and how they retain moisture for this growth. The boys and girls also learn about the problems of erosion and the different kinds of erosion like sheet and gully erosion. In interpreting this information, they learn how the wealth of their State depends upon the wealth of its topsoil, and what the topsoil produces.

The campers learn through demonstrations how different plants mingle together in plant communities. They are shown how water and good soil, or their lack, affect plants. They are taught how soil and water conservation affect

Conservation plan and soil capability maps of nearby soil conservation district cooperators' farms are studied before campers visit farms.

Note:—The author is soil conservationist, Soil Conservation Service, Chesterfield, S. C.

wildlife and, as a consequence, gain a better comprehension of conservation-management techniques.

The campers make trips to nearby Chesterfield district cooperators' farms, where they study examples of soil, water, woodland, and wildlife conservation. They also are told how these practices are planned and applied on the land as a part of a whole soil and water conservation plan, in accordance with the land's capability. As a result, many of the campers have said that they better understood how all of these resources are interdependent and interrelated in the chain of life.

As the camp week closes, the boys and girls prepare for receiving their diplomas by demonstrating their conservation knowledge and skills. A compass course directs them around an area of the camp; and at each station they identify the conservation problems that have made up a part of the week's instruction.

District Supervisor Campbell McLeod said: "I will always be glad for the camp group to visit our farm and see our contour orchards, our conservation irrigation plan, and our pasture management program. I will also always be happy to show them irrigation application."

District Cooperator L. C. Wannamaker is another who has welcomed conservation campers to his beef cattle farm, where they are shown examples of soil, water, woodland, and wildlife conservation. With the aid of an enlarged conservation plan map and the soil and land-use capability map of the Wannamaker farm, the campers can understand more readily the mechanics of a soil and water conservation farm plan.

Many of the boys attending camp are Boy Scouts, and have had a previous interest in conservation. These boys are given an opportunity to develop their interest further, and to work toward Merit Badge requirements in soil and water conservation.

Connecticut "DuckMan"

Bucks Wildlife Shutout

By Theodore W. Pawlowski

DAIRYMAN Edmund S. Ryan is perhaps best known as the duck man by the folks around Beacon Falls in Connecticut.

Ryan, a cooperator with the New Haven County Soil Conservation District, operates a 150-acre dairy farm with 65 milkers. His conservation farm plan, worked out with the help of Soil Conservation Service technicians, has been his field guide for more than 6 years. His conservation system includes sod waterways, tile drainage, diversion terraces on his improved hillside pastures, and a well kept, 1-acre farm pond.

He won the "Outstanding Conservation Farmer of New Haven County" award in 1959. But Ryan carries conservation even further than the good use of his soil.

"Wildlife conservation is important, too," he says. "Farmland is the last place for wildlife here in the Northeast. Closing in of open land with homes is taking over much of our natural wildlife areas."

Ryan and his farm manager, Wilbur Weed, a supervisor in the New Haven County district, do their bit to help wildlife survive in the area. Together, they hatch 60 mallard eggs in an incubator in the cowbarn each year. In addition, they built a nesting house near the pond, where 80 or more eggs are hatched. The young birds are kept in the barn 6 to 8 weeks before being released on the pond, and are cared for as conscientiously as the best-producing cow in the milking herd.

A familiar sight on the farm is the mallards and their young marching from the barn to the pond. From there they spread out over the countryside, and can be seen flying over a large part of the county. Many return to the Ryan pond at regular intervals for food. A few dozen can be found on the pond almost any time.

Note:—The author is area conservationist, Spencer, Iowa, Soil Conservation Service, formerly work unit conservationist, Wallingford, Conn.

Ed Ryan and some of the mallard ducks he raises on farm pond near his barns.

Room For Outdoor Development Demonstrated in Wide-Open West

By D. S. Winn

EVEN the wide-open West has not escaped the pressures of urban population concentration and the need for preserving or developing recreational and other land space. A few miles west of Ogden, Utah, for example, where the urbanization movement is particularly active, an area is being developed into a duck hunters' haven through soil and water conservation action.

Between the Ogden Bay and Bear River bird refuges, the Basin Land and Livestock Company has a ranch headquarters surrounded by lands grazed by sheep during the spring and fall each year. In addition, a small part of the land is farmed, largely to produce hay for winter feed. Last year, Joe Jacob decided he was going to try to do something about improving hunting conditions.

He was especially interested in creating more accessible duck hunting areas as just another part of the overall improved land-use and conservation program being placed on the lands of this ranch. The Weber Soil Conservation District supervisors agreed to provide the technical help to develop a trial program.

Soil Conservation Service technicians working with the district and Jacob went over the ranch areas and selected a 10-acre tract that could be improved. It had deep, medium-textured but imperfectly drained soils, and black alkali, saline salts, and a high water table. The native vegetation was largely saltgrass. Part of the selected and adjacent areas had been farmed successfully to small grains and grass-legume hay. Irrigation for the farmland was supplied by water pumped from a slough. The water easily could be diverted to the area to be ponded.

A dike along the northeast side of the area, equipped with control outlets, adequately served for water control during irrigation, water

Ducks over waterfowl development diked, planted to millet, and flooded before hunting season.

Joe Jacob draws bead from hole-in-dike blind on ducks approaching to land and feed on flooded millet in background.

Note:—The author is area conservationist, Soil Conservation Service, Logan, Utah.

Dike built to impound irrigation water during hunting season.

ponding, or surface drainage operations. The dike was 4 feet wide on top—wide enough to enable hunters to move along it with safe footing.

Water application and hunting access were facilitated by a few supplemental dikes, which also served as border dikes during irrigation and as walkways during the hunting season.

A seedbed was prepared in late June, and 20 pounds an acre of duck millet was drilled. The seeded area was irrigated, and excess water was drained away at 9- to 10-day intervals throughout the season, until late September. A heavy seed crop, estimated at a ton to the acre, was produced; and enough seed fell to the ground to provide the next year's seed.

Ducks, geese, and swan were seen on the area during the early part of the season; but as the year neared its close, ducks were the only waterfowl observed.

Jacob's experience during this first year led him to proceed with the development of an adjacent area for improved hunting. He had sound reason for doing so, because his friends and neighbors agree of his initial development that the "hunting was good!"

Conclusion of a successful opening day on waterfowl development. L. to r. Earl Olsen, Joe Jacob, Joe Henriod, and Brooks Madsen.

NEW USES FOR OLD FARMS

By Gordon S. Smith

FARMING in West Virginia's Alleghany Mountain country is changing as small hillside farms abandoned as unprofitable in past decades are being revived to serve as living sites for outdoor-minded businessmen. These ex-farms, particularly when they are situated along natural trout streams, are ideal fishing and hunting areas, if properly developed.

Joe Bonsall's Rainbow Farm at Zenith in Monroe County is a typical example of this changing land use. Bonsall, a Charleston businessman, bought two adjoining abandoned farms totaling 68 acres near the headwaters of Dropping Lick Stream at the foot of Peter's Mountain. The West Virginia turnpike, running southeast from Charleston, makes the area an easy drive from the city.

The stream still supported a generous quantity of good-sized brook trout. Steep slopes of the little valley were raw from misuse in many places. They could be protected with wildlife food and cover-pro-

Bonsall's 69-acre farm includes two $\frac{1}{4}$-acre trout-raising ponds and a $\frac{3}{4}$-acre bass and bluegill pond.

Note:—The author is field information specialist, Soil Conservation Service, Upper Darby, Pa.

Alvin McCorkle and son, Alvin, Jr., land a trout (see next picture). Only guests—no paying customers—are invited!

ducing vegetation. The place was ideal for Bonsall's plans.

He needed technical help.

He found it through the Greenbrier Valley Soil Conservation District. Soil Conservation Service technicians working with the district developed a plan with Bonsall, through which steep slopes, shallow soils, and wet bottom lands, though poor for crop farming, could be adapted to wildlife plantings and the building of trout ponds. A nearby cave, the source of Dropping Lick Stream, gave a good yearlong flow of cold water with a high alkaline factor, important ingredients for healthy trout reproduction.

The head of the Federal Fish Hatchery at White Sulphur Springs was called in, to help work out a plan that included three ponds, two raceways, three small dams, and a 2,000-foot underground pipeline to supply the ponds and raceways. Two small rock dams built along the stream added extra fishing pools. Native trout easily could run past these dams to spawn upstream. The raceways, 75 feet long and 4 feet wide, could be sealed off in compartments. Control valves there could keep the water at desired levels. Fingerling rainbow and brook trout are kept here from spring to fall and then turned loose in the two trout ponds.

The other wildlife part of the farm plan was equally as unique as Bonsall's trout pond system. Upland game usually found sparse pickings during the long mountainside winters. A variety of food and cover-producing plants was selected to attract game birds and animals to the farm. Bonsall's farm manager, Herbert Shires, cleared five areas of about 1 acre each. An annual mix of buckwheat, soybeans, milo, sorghums, and kaffer corn was seeded in these areas to give wildlife added food. Dogwood trees in adjacent areas were encouraged by clearing out poor-quality trees nearby. Black Haw, Hawthorn, Wild Grape, Sumac, honeysuckle, and other shrubs added along the edges and in odd areas on the farm soon would give good food and cover in times of deep snow.

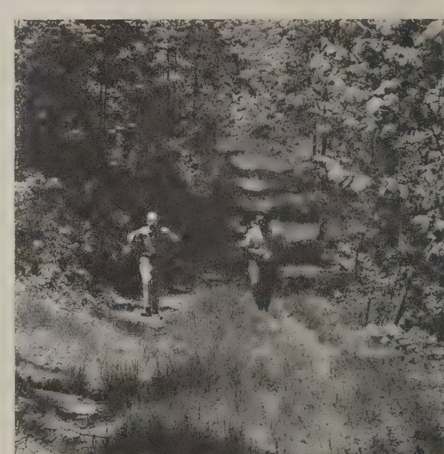
Bonsall planted more than 2,000 Scotch pine, Norway spruce, and Chinese chestnuts on the steep hillsides to stabilize the old scars and to give winter cover and food for his wildlife, and to yield a moneymaking timber crop in a few years.

Access roads through the woods

And here's the proof!

and the pond areas were seeded with Kentucky 31 fescue, and were well fertilized to form a good cover and to stop erosion.

Game birds and animals already are beginning to make the Bonsall farm their home as cover grows; and the ponds are producing rainbows and brooks in sizes that would give any man a yen to cast a fly onto their waters. Fall hunting in Rainbow Farm's hills also has become a real challenge in the well-planned protective cover. These wildlife-recreational "crops" are making better use of local soil and water resources than oldtime erosion-producing crop farming did.



Hiking in. More than a mile of access roads, seeded with Kentucky 31 fescue, have been stabilized on Bonsall farm.

More Ducks—Birds—Beauty

Bare Plains Area Transformed

By Leo GrandPre

IN less than 10 years a group of forward-looking North Dakota landowners turned a stretch of barren land into a scene of beauty and abundant wildlife.

In accomplishing the feat they had a strong assist from the Western Soil Conservation District and the North Dakota Game and Fish Department. But the biggest share of the credit must go to the men whose vision and energy, plus a willingness to cooperate, made such a marked change in the Indian Springs community in Billings County.

It all started with plantings of wildlife cover, trees, and shrubs on the Alfred and George Kadrmas farms in 1951. Before long, the Kadrmas' neighbors, Paul Krush, George and Laudie Jilek, Frank Gresz, and Helmer Krough, liked what they saw and followed suit. Each of the six farms has a wildlife planting, plus windbreaks and wildlife travel lanes, totaling 139 acres.

Stockwater dam bordered by wildlife planting on George and Alfred Kadrmas land.

The Game and Fish Department, foreseeing the value of such plantings in this part of the State, called upon the soil conservation district to plant the trees and shrubs supplied by the Department, which also did the planning. Technical and supervisory assistance was provided by the Soil Conservation Service.

Wildlife has increased since the concentrated plantings of trees and shrubs were completed in 1954. George Kadrmas reported that in 3 years he has observed many coveys of gray partridge and pheasants in his plantings, which offer ideal cover in winter.

George Kadrmas farm with 225-foot-wide wildlife planting (left center) and windbreaks protecting farmstead and feedlots.

Alfred Kadrmas says that wild ducks like to nest in a wildlife planting on the edge of his stockwater dam. Pheasants, partridge, and insect-eating birds are there in abundance throughout the year.

"You should have been here before," the Kadrmases add. "It was barren, to say the least. Hardly ever did we see any of the wildlife observed today. We think it is great."

The other farmers involved enthusiastically echo the Kadrmas brothers' sentiments and take pride in caring for their plantings.

In addition to the benefits to wildlife, the plantings protect farm buildings and yards from drifting snow. Livestock feedlots also get good protection during winter. Meanwhile, the success and beauty of the Billings County tree and shrub plantings have been an incentive to others in western North Dakota.

Note:—The author is conservation aid, Soil Conservation Service, Dickinson, N. Dak.

Watershed Lakes and Farm Ponds

By C

Swimming.—South Carolina.

RECREATION and wildlife benefits from small-watershed protection and flood prevention projects are increasing markedly as more multiple-purpose projects are developed in local communities over the country.

The Federal Government, which pays all the structural costs of the flood-prevention part of a project —except for land easements and rights-of-way, administration of contracts, and water rights—also may pay up to 50 percent of the cost for fish and wildlife development. It also cost-shares on irrigation and drainage developments, and makes loans for municipal water and recreation developments, no part of which is paid for by the Federal Government.

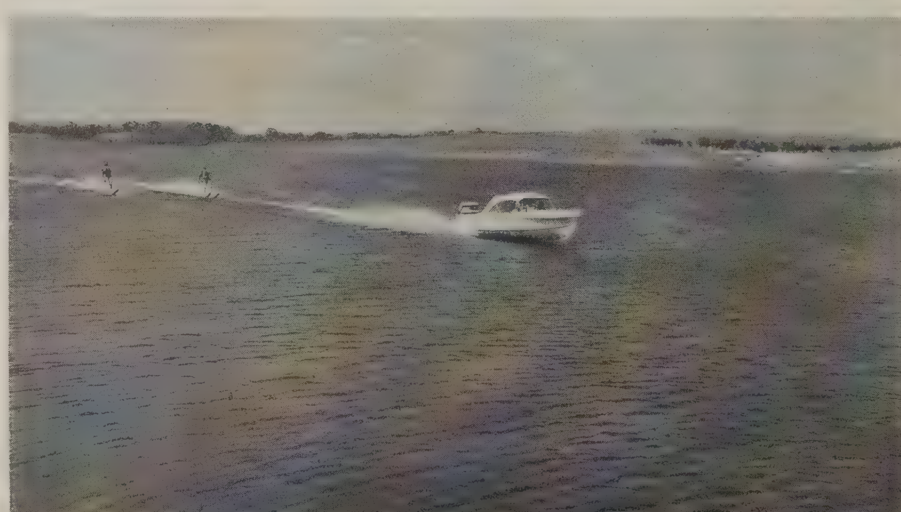
In any case, as multiplied experiences of communities in many States testify, lakes formed behind watershed dams, and other improvements in the watersheds are providing a wide variety of fishing and other wildlife and recreational opportunities to urban and rural people alike. So are the steadily increasing farm and ranch ponds and reservoirs, now totaling about 1,140,000 million built in soil conservation districts, also with Soil Conservation Service technical help.

Examples of these important supplemental benefits are unnumbered. For instance, a study of 117 flood-prevention structures in three States disclosed that the average yearly number of individual visits to those used for recreation was about 2,100 in Arkansas, 700 in Kentucky, and 5,000 in Maryland.

Take Kentucky: One of the greatest benefits recognized locally from structures in the Plum Creek pilot watershed in Shelby, Spencer, Bullitt, and Jefferson counties is the increased fishing, by people from Louisville and other communities. They also are used each year by a conservation workshop held by Eastern State College, and have been used by Boy Scouts. One lake on the North Fork of Rough River in Breckinridge County has become a Kingwood community recreation center, with people catching good sized fish.

The Six-Mile Creek watershed in Logan and Franklin counties, Ark., has received nationwide attention for its performance as a flood-prevention and rural areas development project. Less publicized has been the fact that three of its lakes have been used extensively by Boy and Girl Scouts and other organizations for picnics, swimming, camping, and outings. All of the lakes are stocked with fish, and fishing clubs have been organized on two of them.

Says Executive Secretary Warren D. Fairchild of the Nebraska Soil and Water Commission: "Prior to the advent of the small-watershed program, our State Game Commission was constructing many reservoirs for boating and fishing. They were costing several hundreds of thousands of dollars each. Now, by cooperating in the small-watershed program, we can acquire many comparable recreation areas for our State at a very nominal fee."



Boating.—Oklahoma.

Note:—The author is watershed program specialist, Soil Conservation Service, Washington, D. C.

Boon to Recreation and Wildlife

own

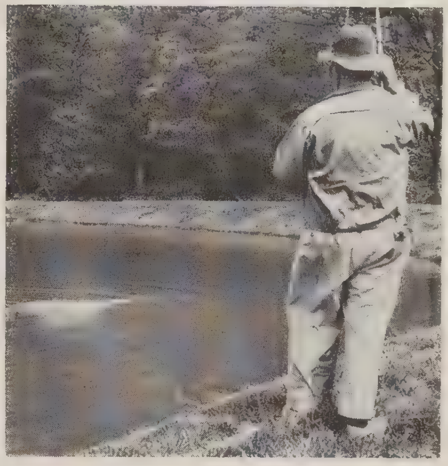
Iowa is one of the States providing many examples of similar out-of-door benefits of watershed project developments. For example: In the Deer-Run Community watershed, as many as 100 people have used the Ed Monson Lake for summer fishing, swimming, and picnicking some days, and for duck hunting and ice skating in winter. After being stocked with fish for 3 years, ponds in the Harmony watershed east of Logan began supplying good fishing in 1961. Residents of Dunlap are depending upon a 10-acre lake in the Mill-Picayune watershed for fishing and swimming.

Also in Iowa, the Petersen-Lapke dam in the Mill Picayune watershed in Shelby, Harrison, and Crawford counties is supplying fishing, swimming, boating, hunting, and wildlife habitat; and the Assman-Evans Lake likewise is used extensively for community fishing, boating, and other recreation. Water impoundments in Iowa's Mortheson watershed in Cherokee County are stocked with fish, and an estimated 2,000 to 3,000 ducks have been observed at one time on the water above one of the larger dams.

Local people have enjoyed good duck and geese hunting at a watershed impoundment in the Clark watershed in Cherokee County. It also is stocked with bass, bluegill, and catfish. In the Robeson watershed in the same county, the Robeson flood-prevention reservoir, likewise stocked with fish, also provides waterfowl hunting; and the Vollmar dam, in addition to providing fishing and hunting, has become a frequented recreational area.

Down in Louisiana's Upper Sabine Soil Conservation District, businessman and district supervisor Ott Williams yielded to the lure of the out-of-doors to the extent of giving up his business in town and moving out to a year-round "summer" home he had built on a bluff overlooking the State's first flood-detention reservoir, for which he had given an easement!

Picnicking and camping.—California.



Fishing.—West Virginia.

Oklahoma is another State experiencing a watershed recreational and wildlife boom. To cite one, Lake Humphreys, near Duncan: Advantages such as boating, fishing, and hunting prompted industries interested in the after-hour activities of their employees to consider Duncan as a prime location. When the city opened the lake for recreation, the modest fees collected in one day paid for the caretaker's new home!

Cheyenne, Okla., established a city park on one of the flood-detention sites in the Sandstone Creek watershed. A sportsmen's club leased another reservoir. Boy Scouts established a camp, and watershed reservoir sites throughout the area are used for meetings by patriotic, civic, church, and farm groups. One Sunday, 40 boats cruised on a 158-acre flood-prevention reservoir in the Washita watershed near Weatherford.

And down in Texas' Sulphur Creek watershed at Lampasas, several of the nine pools stocked are being fished, and one reservoir is used for boating and other recreational uses. A church and shop-

ping center were built on the banks of Johnson Draw at Ozona, previously subject to heavy overflow; and a motel was built on the banks of the arroya in a former heavy-overflow area in the Dry Devil's-Lowery's Draw at Sonora, with the local people enjoying commensurate recreational and related benefits.

From North Dakota to Virginia, the watershed-farm pond story runs true to form: Thus a recreational development at the Renwick Reservoir in the Tongue River project at Cavalier, N. Dak., is serving that purpose well there. In Virginia's widely publicized Mountain Run watershed, the city of Culpeper, Va., found its recreational space for boating and fishing multiplied by its watershed dams. It is developing the first park ever established in the county, at Mountain Run Lake.

Out in Kansas, State Game Protector John Spence had this to say about structures in the Little Delaware-Mission Creeks watershed in Atchison, Brown, and Jackson counties—all stocked with fish, and with grass planted for erosion control and to provide cover and nesting areas for wildlife:

"The watershed has provided an adequate and constant supply of water so necessary for the maintenance of an abundant crop of wildlife, either game or fish. The ponds have been a source of good fishing, and also the holding action of runoff water has prevented the drowning of small birds and animals in the low-lying areas."

In Illinois' Tiskilawa watershed in Bureau County, the Mennonite church has leased a structure site and is developing it into a camp available to church groups of all denominations. And in the Old Tom Creek watershed in Henderson and Warren counties, a noticeable increase in wildlife has been reported. One 20-acre lake has been leased by the Izaak Walton League for recreational use.

In adjoining Indiana, in the Elk Creek watershed in Washington County, a 46-acre lake was formed behind one of the structures. The State Fish and Game Division of the Department of Conservation bought approximately 250 acres around the lake, for development as a public recreation area for the community.

A floodwater-retarding structure built at the outlet of Swan Lake in the Shakopee Creek pilot watershed in Swift, Chippewa, and Kandiyohi counties, Minn., created

Ice skating.—Massachusetts.

a permanent water area so beneficial to wildlife that the local Gun Club bought more shoreline land and installed additional wildlife measures. As a result of improvement along the Chippewa River in the Mud Creek watershed, the city of Benson was able to improve a park area adjacent to the channel, including a picnic area and softball diamond and a relocated and improved golf course.

Stream pollution abatement and related health and other benefits are included among the small-watershed development contributions to a cleaner and more rewarding American out-of-doors. Washington, Ga., for example, built a sewage treatment plant on the headwaters of the Rocky Creek watershed project, after watershed farmers had urged the city to quit dumping raw sewage into the stream before the channel improvement was carried out. And in the Sautee Creek watershed in that State, the tangible benefits have included, in addition to the provision of campsites at one reservoir to the Yonah Girl Scout Council and the Athens Presbytery, the elimination of health hazards, beautification of the countryside, and the attraction of suburban development.

So it is that, across the Nation, a more rewarding, more beautiful, and more healthful out-of-doors all are resulting from these farm and watershed soil and water conservation achievements.

Land and People

A significant meeting on soil, water and related resources was the National Conference on Land and People called by Secretary of Agriculture Orville L. Freeman in Washington, January 18. Nearly 500 leaders from many fields of public interest in the 50 States discussed land, water, forest, grass, wildlife, and recreational resource policy and use as reported upon by a Land and Water Policy Committee the Secretary appointed in August 1961.

"The objective of harmonized and integrated multiple use is increasingly becoming the guiding principle of management for much of our public and private land and water resources," the Committee reported, adding: "The whole problem of encouraging more diversified use of public land by the owners, and of making certain types of private land available for public use under terms attractive to owners, is one of the new frontiers of land policy . . . Outdoor recreation is one of the increasingly significant types of multiple uses."

Secretary Freeman said: "Every American wants to see the land used efficiently and effectively. Our national purpose is to use resources; it is not to have land lay idle."

Colorado Tree Plantings Multiply Game and Song Birds

By W. S. Swenson

UNTIL recent years there were parts of Colorado in which a motorist could travel long distances without seeing more than an occasional tree or more than a few kinds of birds.

Today, thanks to the cooperative efforts of the Colorado State Game and Fish Department and the State's soil conservation districts, there are more than 2,000 acres of tree plantings in these once treeless areas. Game and song birds by increasing thousands are making good use of these plantings. In some areas, tree squirrels and deer also use them. Another important consequence of this cooperation is the saving of money and a reduction of overlap in tree-planting programs.

A few years ago, both the Colorado Game and Fish Department and the farmers' and ranchers' soil conservation districts were pressing ahead with the planting of trees in the same areas. Although their purposes were almost identical, the accent of one was to provide wildlife with food and cover and to give wind-erosion protection, too, and of the other to provide wind protection, with wildlife as a secondary benefit.

Representatives of the soil conservation districts, the Soil Conservation Service, and the Game and Fish Department got together on a new approach to the problem. For example, where the Game and Fish Department provides tree-planting stock for windbreaks and other purposes, and the planned plantings are beneficial for game, the landowner is informed that planting stock can be furnished at no cost through the Department. Trees from the Game and Fish Department are paid for partly with Department funds and partly with Pittman-Robertson funds, administered by the Fish and Wildlife Service.

Russian olive planted about 1940 form outside row of windbreak.

Pheasants in windbreak planting in Logan County in northeastern Colorado.

Farmers cooperating with soil conservation districts prepare the land, plant the trees, and tend them. The districts provide tree planters where they are available. They also furnish trucks to haul planting stock to the cooperators.

In the first year of the program, 1956, requests for trees totaled about 120,000 seedlings. By the 1960 planting season, 211,000 seedlings were furnished to district cooperators.

A recent field checkup by Soil Conservation Service and Game and Fish Department technicians showed that the farmers are doing an excellent job of planting and tending the trees.

In the 5-year period, 875,000 trees were planted under this program, and were expected to pass the 1-million-tree mark in 1961.

Among the trees adapted to eastern Colorado, an area plagued with recurring drought, where trees have to be hardy to survive, are Ponderosa pine and Rocky Mountain juniper, both difficult to establish. The Game and Fish Department, in

Note:—The author is woodland conservationist, Soil Conservation Service Colorado Springs, Colo.

order to overcome this difficulty, supplies virtually all conifers in tar paper containers. Planting potted evergreens has done wonders toward establishing these trees. Almost one-third of the trees in this program are now evergreens, and the percentage grows each year.

Nursery stock comes from commercial and Clarke-McNary nurseries. The nursery at Colorado State University pots evergreens on a contract basis..

At the outset, it was decided to provide only those species of trees that had been proved suited to the climate. Most of the seedlings provided are squawbush, skunkbush, Caragana, Russian olive, Siberian elm, hackberry, Rocky Mountain juniper, and Ponderosa pine. Other species of seedlings planted in lesser numbers include sandcherry, plum, chokecherry, green ash, honey locust, and spruce.

Trees furnished to the soil conservation districts can be used for farmstead or field windbreaks, or for wildlife food and cover plantings. Many wildlife plantings are made in odd areas and around water developments.

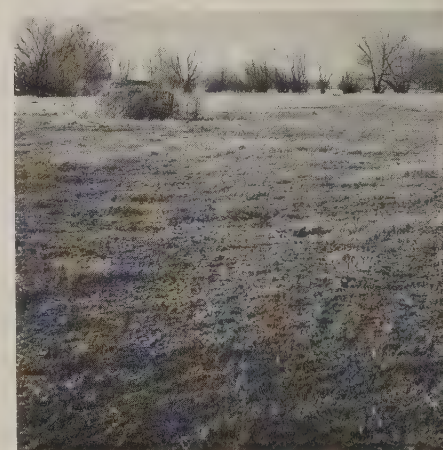
Almost any tree planting will be used by game birds, and the plantings in Colorado show their widespread use. Hunters, who now head for the tree belts on opening day of the pheasant season, seldom are disappointed.

Fish and Fowl and Fine Black Angus

By Burrell D. Osburn

FISHING and waterfowl hunting are combined with good pasture production in a multiple land-use management system worked out by Wapato Soil Conservation District Cooperator Carl Weisbrod in central Washington.

At Weisbrod's request through the district, the Soil Conservation Service helped him determine the feasibility of flooding 80 acres of native and seeded pasture on his farm with water from Toppenish Creek that bisects the acreage and supplies the fishing. After a detailed topographic survey was made, the system selected out of three considered, provided for three dams and a series of dikes to hold water, with water released from the flooded area by means of pipe outlets to the dry pastures at lower elevations. The dams were constructed so as to allow for raising and lowering water by means of "flash boards." A strict control is used to regulate irrigation water.



This area is flooded to irrigate pasture in summer and furnish wildlife habitat in late fall. (Note duck blind in background.)

Toppenish Creek, with wooden dam and earth dike in background and as yet unseeded sloped banks in foreground.

After the pasture and irrigation season, the dams and dikes are used to flood the same area, and Weisbrod then leases the area to waterfowl sportsmen for the hunting season. He points out, however, that the duck hunting and fishing are subordinate to the production of grass for his high-quality Black Angus herd. Weisbrod feels that his grass-reseeding pasture management system during the next few years will increase the cattle carrying capacity many times over.

He has considered developing the same type of multiple land-use conservation plan on an additional 40 acres adjacent to his other tract.

Note:—The author is work unit conservationist, Soil Conservation Service, Toppenish, Wash.

Fishing Tourists Need Bait

By Ralph N. Bell

N. Mex. "Fish Farmer" Obliges

R. T. "BOB" GAGE calls himself a "fish farmer." Any day, at any time, you likely will find him in his "fish house" grading and sizing minnows. From an 8½-acre farm on the Gallinas River north of Las Vegas, N. Mex., Gage has been a principal supplier of minnow bait to fishermen at the Conchas Dam near Tucumcari.

Gage, in comparing his minnow production business with conventional farming, commented:

"This is an operation that must be watched as carefully as the feed ration for livestock. Individual attention is required for each fish pond, because of different sizes of ponds, different water temperatures, and the differing mineral content of stream and spring waters."

His working tools are fish traps, seines, and his boots.

"This is a business where you can get your feet wet all right," he explained, "a business that requires patience, persistence, and constant learning."

Gage became interested in the minnow business while he was with the New Mexico Fish and Game Department in 1947 and 1948. He saw the business opportunity of minnow production as sport fishing mushroomed during post-World War II years. He started his minnow business, with Las Vegas as his headquarters under a permit from the Department to trap and seine nongame fish minnows from the lakes, ponds, and streams of northeastern New Mexico.

The demand for minnows is generally April to October. The annual tourist load of 250,000 or more to the Conchas Dam keeps Gage plenty busy during the fishing season. At the start, the streams, lakes, and ponds of this area provided him with his minnow supply for marketing. As the fishing pressure grew and more and more streams were stocked with game fish which cannot be trapped or seined, Gage started developing his fish farm. Included were a water-supply pond, a "growing" pond, and four "working ponds."

As a cooperator of the Gallinas-Tecolote Soil and Water Conservation District, he decided upon a basic conservation plan calling for improvements to existing ponds, development of a well, establishment of a water-circulation system through the minnow-hardening and growing ponds, fish pond fertilization, and the conversion to grass of croplands used in his operations. He had guidance from Soil Conservation Service technicians working with the district.

Gage's goal is to increase his production from about 10 percent of the minnows he markets to 100 percent. The main species grown are "fat heads," with a few "shiners" on the side. The minnows are wholesaled to bait concessions at the Conchas Dam.

In past years, he fertilized his growing pond with barnyard manure but was not satisfied, because of the residue and gas produced by the decomposition of organic matter. After he switched to 16-20-0 commercial fertilizer, his minnow production was the highest since he started. Although his success resulted from pond fertility alone, Gage's 1961 program called also for feeding the minnows a supplement of regular growing mash like that fed to poultry.

"I feed as much growing mash as many poultry producers," he remarked. "That is way I call myself a 'fish farmer.' "

Bob Gage and Work Unit Conservationist Ralph Bell of the SCS discuss minnow pond fertilization and other improvements.

Note:—The author is work unit conservationist, Soil Conservation Service, Las Vegas, N. Mex.

Conservation Watershed Management Restores Creek Flow

By Don Wilbert

RIGHT in the middle of a string of dry years formerly intermittent Johnson Creek in Wyoming became a live and yearlong running stream.

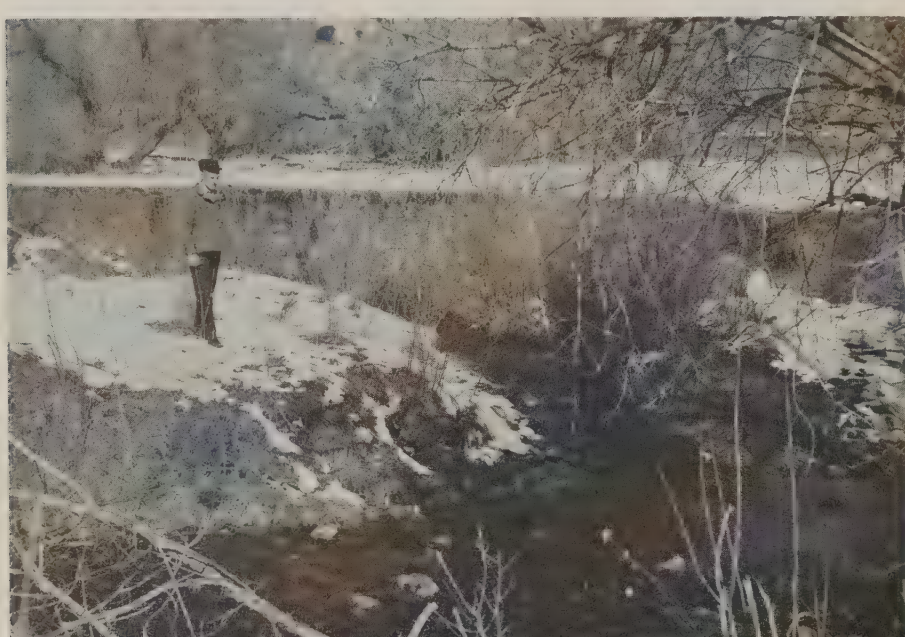
No one locally can remember when the creek had run water year-round. It always flowed a lot of water—some of it dirty and muddy—for a short time in the spring, but tapered off to nothing by mid-August or early September. There are a couple of springs that never dried up completely, but these never ran enough water to reach the highway crossing during the fall.

The place is the Sybille Experimental Unit operated by the Wyoming Game and Fish Commission. In 1948, the Commission bought a ranch in Wheatland Canyon, to carry on research in game animals and birds. One of the first things Floyd Blunt, biologist in charge, did was to apply to the Wheatland Soil and Water Conservation District board of supervisors for technical help in developing the unit. The application was approved and, through the district, Soil Conservation Service technicians prepared soil capability maps and planned land-use maps which Blunt refers to regularly in arriving at his land-treatment decisions.

At the lower end of the ranch, the Wheatland to Laramie highway crosses Johnson Creek which joins Sybille Creek. Virtually all Johnson's Creek's drainage area is on the research unit. At that time, the hills were almost bare. It was 1952 before Blunt got money to start replacement fencing of the 2,500-acre Johnson Creek area, to stop cattle drifting in from surrounding pastures. There has been

Blunt and "research assistant."

no grazing by domestic livestock since.



Confluence of Johnson and Sybille creeks today.

A series of dry years began in 1953, when the fencing was completed, and lasted through 1958, except for 1957. In spite of the below-average precipitation, Blunt noted a gradual increase in the length of time the stream flowed in 1954 and 1955. Then, in 1956, the stream flowed all fall and winter—and it hasn't quit flowing since.

In fact, the flow seems to be getting stronger each year. In the fall of 1960, for example, the creek was running *more* water at its confluence with North Sybille Creek than Sybille Creek was, even though Sybille Creek has a drainage area at least 15 times that of Johnson Creek!

Johnson Creek has not been muddy in the past 4 years, even when hard rains hit the area; but Sybille Creek has become a muddy torrent

Note:—The author is range conservationist, Soil Conservation Service, Riverton, Wyo.

on several occasions and runs high and muddy for 30 to 60 days each spring. Johnson Creek used to do the same thing but now carries clean, clear water even when it runs higher in the spring. That is because its watershed slopes are covered with mid-grasses, and the bottoms are growing up to basin wildrye and other good grasses. The browse plants are healthy and vigorous. The vegetation all has recovered naturally, in spite of drought, and causes slower, but steadier, release of water into Johnson Creek.

The area also has improved as deer range. Blunt believes there are at least 200 deer on the Johnson Creek pasture, or about 50 deer to the section, or 1 to every 13 acres.

Flood-Prevention Dam Brings Outdoors To the Kids

By Wayne M. Hypes

FLOOD protection and the building of better equipped citizens for the future are among the tangible benefits of one of the dams built in the South River watershed of the Potomac River as part of the nationwide flood-prevention program in 11 of the Nation's major river watersheds.

Working with the Soil Conservation Service, the Kiwanis Club of Waynesboro, Va., is providing camping facilities for 120 underpriviledged children each camping period in the South River project. The club has been working closely with city welfare officials and with the local United Community Fund for more than 15 years to make adequate camping available to deserving boys and girls.

The greatest problem that remained unsolved until recently was finding camp facilities large enough to accommodate more children, and with enough water for water sports. They now have complete camping facilities, including a modern kitchen, mess hall, separate barracks for the boys and girls, an administration building, and a large recreational area surrounding the 7-acre lake.

It all started back in 1954, when the Shenandoah Valley Soil Conservation District and the South River Watershed Association were getting easements and rights-of-way for the flood-prevention dams. But on dam site No. 4 (Pine Run) they were not able to get the required easements. It looked hopeless, and proposed dam site No. 4 was all but abandoned. Then the Waynesboro Kiwanis Club bought the 235 acres of land for $8,000 in 1958 and granted the necessary easement for building Dam No. 4. It was completed in 1959, with Federal technical and financing assistance made available through the Soil Conservation Service. With storage capacity for 544 acre-feet of floodwater, the nearly 50-foot-high dam has a 7-acre permanent lake.

Campers await their turn for a boat ride on 7-acre lake formed by South River watershed flood-prevention dam.

Flood-prevention lake before buildings were constructed on Kiwanis campsite.

Note:—The author is work unit conservationist, Soil Conservation Service, Staunton, Va.

Counselor (right) supervising swimming in flood-prevention lake. (Dam in background.)

The Waynesboro Kiwanians following through with their dream, and, with more hard work, immediately started building the children's camp, at a cost of about $15,000. By mid-June of 1960, the first group of 59 underprivilged children between the ages of 6 and 12 arrived for an experience they never dreamed could be theirs. They were followed by another group of 35 children on June 27.

For 2 weeks, these children received, for the first time, needed supervised outdoor recreation. Under the supervision of Truman Southall and his wife, as camp director and nurse, they learned and benefited from well-rounded summer camp life, including boating and swimming, and campfire programs on the waterfront.

At the close of camp in 1960, more sand was brought to the beach area; all buildings received another coat of paint, and the administration building was completed. The club planned continuing improvements, such as additional softball fields, basketball courts, an outdoor theater, more boats, and other equipment. Complete landscaping is planned, with emphasis on preserving as much of the woods and grove effect as possible.

The Kiwanians are making the camp available at a nominal maintenance rental fee to church groups, 4-H Clubs, Boy and Girl Scouts, and others seeking outdoor recreation and training.

Meet Mr. Beaver . . .
Engineer and Conservationist

By Kenneth E. Riergard

THE headwaters of Big Meadow Creek in the forested lands of the Latah Soil Conservation District in northern Idaho tell a vivid story of the beaver as a natural-born ''engineer'' and water conservationist. The contrasting story of man's interference in this natural scheme is to be found there, too; but the score adds up to victory for the beaver!

The watershed of Big Meadow Creek lies in the central part of Latah County, occupying a part of the south slope of Moscow Mountain and covering about 2,000 acres of mixed conifer timberland. Spring runoff from melting snow and early rains swell the streamflow, and the steep gradient of the channel as it passes through the wooded section of the watershed produces a large volume of water moving at high velocity.

In the lower reaches of this section, on land owned by the University of Idaho, the beaver have built and maintained a series of dams which ''stair step'' the water down the channel. These dams are high; each one raising the water from 3 to 5 feet, forming a massive chain of rustic drop structures. Their spacing is close enough that the pools of slack water reach from dam to dam.

The effectiveness of these beaver operations as a real soil and water conservation measure is obvious from the stabilized condition of the

Note:—The author is work unit conservationist, Soil Conservation Service, Moscow, Idaho.

creek channel in this critical section. The overall water control achieved here, in itself, is tremendous. The late-season water storage from the dams is a significant factor in providing fish habitat, and livestock water in the watercourse below likewise is improved. The dams also have detained large amounts of silt from the mountain above.

About a mile downstream, the creek moves into a broad meadowland and enters a farmland section. Here, it formerly followed a rather shallow, medium-sized channel, that was largely sod covered and generally stabilized. The water was quite well confined during normal water level, and there was room for the high water of the spring runoff season. The beaver had built several low dams across this broad carpet of native sod. One of these dams still remaining is only 18 inches high, but it is more than 100 feet long, and as recently as 8 years ago, there also was an active beaver dam below this point where now there is only a ragged channel.

This is on land owned by David Sterner, a cooperator with the Latah Soil Conservation District, whose farm is 4 miles north of Troy in the central part of the county. He had just acquired the farm then, and was pleased at the way the beaver had the creek under control. He was anxious to keep them as his partners in soil and water conservation.

Sterner is emphatic in denouncing the unfortunate series of events that began when, unknown to him, trappers took out most of the beaver on his land, about 5 years ago. With the dams unattended by nature's engineers, high water broke down the dams; and, within a very few years, the present scene developed—a ragged channel, 6 feet deep, eroding and cutting farther back into the meadow floor each year.

"The beaver should never have been taken out in the first place," Sterner said in looking back over the situation. "I am sure that if they had been left to themselves, my creek channel would not be the mess it is now."

Meanwhile, the beaver stronghold on the University land upstream has withstood in remarkable fashion the buffeting of flash floods and the visits of the occasional trapper.

This story of Big Meadow Creek provides clear evidence of the value of the beaver as an upstream conservationist. Clear water flows over Sterner's well-tended dams in a completely stabilized channel. Floodwaters are stored in his ponds for partial release later, maintaining a more constant streamflow through the farmlands below.

Contrast this picture with gullied stream channels that are detrimental to the landowner and that result in the cutting away of valuable land, in silt deposition in the downstream section, and in lowered water tables and flash floods. Such erosion marks the beginning of difficult and costly maintenance work, calling for Soil Conservation Service technical help and other assistance.

Thus the beaver, Nature's original upstream engineer, proves by his works that he has an important role to play in our soil and water conservation program.

Still active beaver dams with excellent water control on upper Meadow Creek.

New Wildlife Film

"We Share This Land" is the title of a new wildlife film by the Soil Conservation Service.

Timed for a quarter-hour television showing, the film is in color and is filled with the sounds of wildlife. It is being made available for bookings through SCS State offices.

◆

The recently published National Survey of Fishing and Hunting by the Department of Interior reports that the American people have turned in ever-increasing numbers to the out-of-doors, with money spent on vacations having doubled in the post-World War II period. Use of automobiles by hunters and fishermen, for example, increased by about 26 percent between 1955 and 1960, to a total of 13¼ billion miles driven by outdoor sportmen in 1960.

Village Forest Conservation Means More Water For Power

By Lester Fox

BRIGHTER lights and fatter treasuries are among the rewards that Morrisville and other Vermont communities are realizing from their conservation programs on the wooded watersheds upon which they depend for electric power generation.

But for conservation on its watershed woodlands, the Morrisville village-owned power plants would at times fail to produce electricity for home, farm, and business. The village owns and operates two generating plants on the Lamoille River. In addition to taking care of its own needs, Morrisville supplies electricity to surrounding farms and communities.

During dry summer months, the Lamoille gets too low to maintain power production. To overcome that handicap, Morrisville, a cooperator with the Lamoille County Soil Conservation District, bought 5,934 acres of the Green River watershed near Garfield. Nearly all of it is in forest. The village cleared 625 acres and built a dam across the Green River in 1945-46.

Waterpower and beauty. Lamoille County Forester Arlo Sterner (left) and SCS Technician Eugene R. Fellows, Jr., look over Green River reservoir.

The 625-acre lake that the dam created is used to maintain the normal level of the Lamoille River into which the Green flows. As the Lamoille level drops in dry summer months, water is released into it from the lake. In that way, power production can be kept constant the year round, and the area retains its natural beauty for the enjoyment of city visitors. The lake drains 14 square miles, discharges a maximum of 1,000 gallons a second, and has a full capacity of more than 5½ billion gallons.

Village officials realized that, in order to protect the lake, they would have to manage the forest by modern scientific conservation principles, or the forest would deteriorate, the soil would erode, sediment would pile up in the lake—and sustained income from the woodland would be lost. They accordingly developed a conservation plan through the soil conservation district. Management of the forest helps regulate runoff of rain and snowmelt and lets the water soak into ground storage for steady, year-round release into the lake. Even the snow is contributing more water than it used to.

State foresters arrange for thinning and culling, and supervise planting and harvesting. Timber sales bring in $3,000 to $4,000 a year.

Hardwoods make up two thirds of the forest. The forest had been cut over haphazardly in the past; but, under scientific management, the more useful species are counted upon to prosper and, in time, to dominate the forest. The woodland income also is expected to increase as the forest is improved. Meanwhile, the managed forest protects the lake and assures electricity for Morrisville and other communities.

Ninety Vermont towns and communities have more than 33,000 acres in State-managed municipal forests.

Note:—The author is field information specialist, Soil Conservation Service, Upper Darby, Pa.

A Fish Story—Plus

By Arland W. Andrews

WILDLIFE and recreational benefits have multiplied the value of the irrigation reservoir behind a dam built on the Denley brothers' ranch in southwestern Oregon.

The dam was completed in 1959 with Soil Conservation Service technical help provided through the North Douglas Soil Conservation District with headquarters at Sutherlin. It has a capacity of 132 acre-feet of water and a surface area of 20 acres. In addition to supplying irrigation water, the lake is a welcome recreation center for all the Denley family, including brothers Jack and Joe and their father, Henry. But it is the fishing that draws the most comment.

The lake was stocked with Kamloop and Rainbow trout at the recommended rate of 750 fish to the surface acre. The Denleys say that legs from the deep-throated jumbo bullfrogs that also established residence at the lake make excellent eating.

More than 500 ducks, stopping over on their way north, have rested and fed at the lake in a single season, with as many as 150 of them remaining as late as May. Many deer may be seen watering along the shoreline at dawn and sunset. Bear and cougar tracks reveal that these animals also venture out of the safety of the surrounding hills to share the Denley lake water.

The well planned and constructed water conservation installation not only is a good source of irrigation water for the Denleys' pastures and for their livestock, a haven for fish and wildlife, and a place of family relaxation, but also has helped to prevent flood and soil erosion damage. All of these uses in one package give the Denleys cause enough to take pride in their lake.

Note:—The author is engineer, Soil Conservation Service, Portland, Oreg.

Jack Denley takes time out on a busy day to fish with Ronnie, Randy, and Ricky.

These 12 fish—plus 4 more—resulted from late-afternoon's fishing by the kids in the Denley reservoir.

Multiple Resource Use and Modern Farming

Alternatives will present themselves if we begin by redefining the broad term farming. Rather than limiting it to the production and sales of goods through direct or indirect exploitation of the soil, let us take a broader view and assign a service function to farming: namely, land and resource management. Certainly a good manager . . . in many instances . . . can combine two or more functions as did the farmer who built a large pond for crop irrigation and stocked it and sold fishing rights to the public.

This example brings us to multiple use, which is based on a more inclusive definition of farming and proposes that the income for agriculture can be broadened without curtailing its traditional function. . . .

The American farmer has outgrown the first phase of his evolution and can deliver food and fiber to meet the full demands of the market . . . He is in the midst of his second phase, learning to produce for a specific market. The third and mature phase is the truly challenging one: recognizing his principal function is resource management to the long run benefit of everybody.—HENRY RENOUF, Pres. Massachusetts Association of Soil and Water Conservation Districts.

OUR NATIONAL PARK POLICY. By John Ise. 701 pp. 1961. Johns Hopkins Press: Baltimore, Md. $10.00.

Few of the more than 72 million persons who visited national parks in the United States last year had the slightest notion of the long, uphill battles waged to build and hold our great system of national parks. The few farsighted and idealistic men and women who foresaw the need for these parks and who battled tirelessly for them are largely unknown to their growing millions of recreation-seeking beneficiaries. But the work of pioneers and contemporary planners and administrations of our national park system is well documented in OUR NATIONAL PARK POLICY, a history and analysis of the national park program and policy. This is not a book for casual reading by the average park visitor. It is, rather, a reference work that traces the development of national parks through one administration after another, and analyzes the problems that confront park administrators today as Americans flock outdoors in phenomenally increasing numbers.

—D. Harper Simms

AMERICAN WILDLIFE AND PLANTS, A GUIDE TO WILDLIFE FOOD HABITS. By Alexander C. Martin, Herbert S. Zim, and Arnold L. Nelson. 500 pp. 1961. Dover Publications, Inc.: New York. $2.00.

This book is a standard reference to the food-habits of wildlife in the United States, particularly of birds and mammals. Except for a paper back and slightly smaller page size, this Dover edition is an exact reproduction of the very successful original edition published in 1951, but out of print for several years.

Part I is introductory and explanatory. It includes two chapters of special interest to soil conservationists: ''The Plant Roots of Wildlife'' and ''Farm Crops and Wildlife.'' The reading of these chapters will help anyone to understand better the important relationship of agriculture to wildlife.

Part II is concerned primarily with birds and mammals, and presents information regarding the food and feeding for all common species. Part III deals with plants—cultivated as well as wild—that are known to be eaten in significant amounts by wildlife. There are small but accurate distribution maps for most of the common animal and plant species, and many are illustrated with line drawings.

Although our knowledge of the food for wildlife has increased in the past 10 years, this volume is the only general reference on this subject. Anyone interested in wildlife or having responsibilities for its welfare will find this book helpful.

—Lawrence V. Compton

WILDERNESS, AMERICA'S LIVING HERITAGE. Edited by David Brower. 204 pp. 1961. Sierra Club. San Francisco, Calif. $5.75

This book presents the papers and discussions heard at the Seventh Biennial Wilderness Conference in April 1961. The conference was sponsored by the Sierra Club, a national conservation organization founded in 1892 to protect the Nation's scenic resources of parks, wilderness, wildlife, and the recreation derived from them.

Over the years, the editor points out, ''the Sierra Club has been well aware of the dual aspect of conservation, calling on the one hand for much wise utilization of resources on at least 90 percent of our land, and on the other hand for some wise preservation on at most 10 percent of our land.'' The papers in this volume are concerned mainly with the latter 10 percent. They express the viewpoints of 25 noted commentators, including Secretary of Interior Stewart L. Udall, Associate Justice William O. Douglas, and Governor Edmund C. Brown of California.

The theme of wilderness as a living heritage is illustrated by 26 photographs by Philip Hyde.

—Lawrence V. Compton

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Soil Conservation

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UNITED STATES DEPARTMENT OF AGRICULTURE 1862 1962

Growth Through Agricultural Progress

Soil Conservation
25 Years Ago

"It is recognized that plants are ultimately both the most effective and the cheapest method of controlling erosion. At the same time, the plant cover affords the best means available for diagnosing the degree of erosion that has occurred or the stage of recovery. . . . Ecological research also includes the mapping of plant distribution and the delimitation of vegetation zones . . . Plants exist which will grow in virtually all types of environment."

•

"To prevent rejuvenation or the renewal of excessive cutting, the watershed of the gully must be protected. This may be accomplished by cultivation practices to prevent excessive run-off, by revegetation, or by building up the organic content of the soil. The valley below must also be protected in order to prevent the stream from lowering its present base level."

COVER PICTURE.—A fine seed crop of intermediate wheatgrass in Teton County, Wyo.

Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

SOIL CONSERVATION is the official organ of the Soil Conservation Service, published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication was approved by the Bureau of the Budget, June 26, 1958.

FRANK B. HARPER, Editor

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Plant Materials Basic To Soil and Water Conservation

By Donald A. Williams

PLANTS are indispensable to the life of the land—anywhere.

Only grass or trees can hold the soil on steeply sloping lands that wash and erode when man breaks their surface with his plows.

Grass and legumes grown in rotation with clean-tilled food and fiber crops make it possible for less-sloping, undulating lands to be cultivated at least part of the time.

Even on the most nearly level and fertile land, plants—be they grass or legumes, trees, or crops like corn, cotton, or small grains—are essential to maintaining the tilth and friability of the soil. Without them, even the most fertile and level lands would become compacted and unproductive.

Soil and water conservation planning and land treatment begin with plants. Even watershed flood-prevention dams, farm field terraces, and other earthen conservation structures require vegetative plantings on them; otherwise, the bare cuts and fills would be destroyed, for all practical purposes, by water or wind erosion on unprotected raw soil surfaces.

The Soil Conservation Service provides specialized assistance and counsel in the use of plant materials by land users in soil conservation districts, watersheds, rurban areas, and elsewhere, as part of the coordinated soil and water conservation program. Part of its job evaluates conservation plant materials and their cultural and management requirements. It also brings to the attention of research agencies research needed to improve promising plant materials and to solve problems of plant culture and management.

To facilitate this essential activity, the Service maintains 18 plant materials centers in the principal plant-growth regions of the country. They work cooperatively with State and Federal agencies. These centers provide locations for effectively supervising and systematically conducting necessary observations and evaluations of promising conservation plant materials available from plant introduction centers, research plant breeders, or in their native habitat, but which are not available commercially or from publicly supported agencies, or the adaptation and use of which for conservation purposes are not sufficiently known. The Service produces only the materials needed for observational plantings to determine soil and climatic adaptations and conservation uses. It then encourages commercial seed producers and nurseries to take over production and distribution. Development of new plant varieties and related work is recognized as the primary responsibility of the State experiment stations or other research agencies.

The Service's first concern is to help the farmer or rancher to do a better conservation job. We thus seek to help to fill the gap between experiment station plant work and the land users' experience and need. It likewise seeks to help hasten the general use of adaptable grasses and other plants, through its technicians' day-by-day contacts with the farmers.

The list is long of grasses and legumes alone that have demonstrated their adaptability to the various agricultural regions for conservation use and forage production, including many that have come into widespread use through Service plant materials work. These range from field brome and birdsfoot trefoil in the Northeast and the Cornbelt to Kentucky tall fescue and bahiagrass in the Southeast; and from Blackwell switchgrass and King Ranch bluestem for the Great Plains to Sherman big bluegrass and Lana vetch for the West. Similar achievements have been made with trees and shrubs, for erosion control, wildlife, and other uses.

The growing importance of grass crops in American agriculture challenges the abilities of conservationists to keep apace of future needs. Not only is nearly 60 percent of our total land area in grasslands, hay lands, or forested grazing areas; but there is approximately 40 million acres of cropland in the United States that is unsuited for continued cultivation, because of erosion or other reasons. Another 47 million acres is eroding and losing soil under continued crop use, and erosion still is a serious problem on 200 million more acres of cropland. Grass and legumes, trees and shrubs are plant materials that figure most importantly in needed land-use adjustments or management on all of these lands. Known plants do not meet all the varied conditions on these lands. New plants and improved techniques must be found to do this job more adequately.

Grass Improvement Benefits Ranchers and Community

By A. L. Hafenrichter

An outstanding community event in Idaho is the annual grass tour sponsored by the Twin Falls Soil Conservation District. It is attended by farmers and ranchers from neighboring districts and adjacent States, and by bankers, editors, tradesmen, and scientists.

The success of this district in growing and managing range grasses and producing seed of new and better varieties is responsible for the wide interest in this annual tour. This success was achieved in but a few years, despite several seasons of less-than-average rainfall. An important result has been improvement of the agriculture and the economy of the community.

When the Twin Falls district was organized in 1951, irrigation water for its 140,000 acres of cropland was in short and uncertain supply; and large areas of its 815,000 acres of rangeland were growing only sagebrush and annual cheatgrass.

People in the community doubted if the poor condition rangelands could be improved at reasonable cost where the average rainfall is only 9 inches. The Aberdeen Plant Materials Center supplied the district with enough seed for a trial planting of 20 acres of crested wheatgrass and 20 acres of Whitmar wheatgrass on Ellis Fuller's range on Hub Butte, where he had cleared 40 acres of sagebrush with a rotobeater. Fuller drilled the seed that spring.

A year later, the 40 acres on the Butte was a conspicuous patch of green, in contrast to the dull gray of the sagebrush on the remainder of his range. Fuller grazed 50 cows for 3 weeks on this 40 acres, and also harvested some seed. He said that before the seeding was done, the whole 160 acres in that field would not carry one cow through the summer.

Other ranchers in the district were quick to follow the example set by the plantings on Hub Butte. Soil Conservation Service technicians serving the district selected the areas to be seeded according to the type of soil and its moisture-holding capacity. Ralph Schnell made successful seedings of the same grasses Fuller used. Harry Noh planted Greenar and Topar wheatgrass on good upland soil.

C. D. "Red" Odell seeded about 100 acres to the new Siberian wheatgrass that had just been developed by the Plant Materials Center. It proved to be better adapted to arid conditions, to have a longer greenfeed period, and to have better feeding quality than crested wheatgrass. Harry Noh had 300 acres of alkaline land along a creek bottom that he regarded as almost worthless for grazing. He was advised to plant Alkar wheatgrass. Now he regards that 300 acres as valuable, and uses it for grazing his Angus herd.

The several good seedings of new and better range grasses stimulated the supervisors of the district to stress range seedings on an annual basis. Ranchers were encouraged to seed depleted ranges to adapted

Noh admires his Black Angus cattle grazing on lush tall wheatgrass in Twin Falls (Idaho) SCD.

Note:—The author is Washington field plant materials technician, Soil Conservation Service, Portland, Oreg.

species just as fast as the ranches could be planned and the sites selected for seeding.

Meanwhile, the district supervisors were advised to encourage their cooperators to grow seed. For example, the late Jack Farrar pioneered the seed-producing effort by growing a crop of Siberian wheatgrass seed on his irrigated land. The yield was good, prices were favorable, and there was a ready local market. Even more important was the fact that this profitable crop required much less irrigation water than other cash crops normally grown there.

The upshot was that a new industry was born as a result of Farrar's experience. Other ranchers on irrigated lands began to grow grass seed. At first, seed was grown to meet local demands and to aid the district's annual range seeding goal. However, the news of the successful range seedings had spread as a result of the "grass tours," and the demand for seed from other soil conservation districts in Idaho and in neighboring States increased.

There are now, 7 years after Farrar's pioneer effort, more than 75 seed growers in the Twin Falls district. They produce ½ million pounds of seed annually. This new crop averages more than ¼ million dollars. All of the seeds are new varieties, and are certified by the Idaho Crop Improvement Association. Five new seed plants have been established in the community.

Available seed, the plan of the supervisors of the district, and the efforts of the pioneering ranchers have resulted in 130,000 acres of seeded rangeland in just 7 years. These seedings are estimated to have increased the value of the land from $4 an acre to $20. The new perennial grasses supply a reliable source of good feed, in contrast to the low and erratic production from annual cheatgrass. Ranchers have been able to maintain and increase their herds.

An expanded livestock industry is resulting from reliable feed supplies. A profitable seed industry is thriving. Precious water supplies are being conserved. The entire community is benefiting.

Pioneer grass seed producer Ernest Egan, Twin Falls, Idaho, in Siberian wheatgrass field.

Another pioneer Twin Falls SCD seed grower, the late Jack Farrar, inspecting Siberian wheatgrass.

TREES for North Dakota's Future

By Otis Tossett and John McDermand

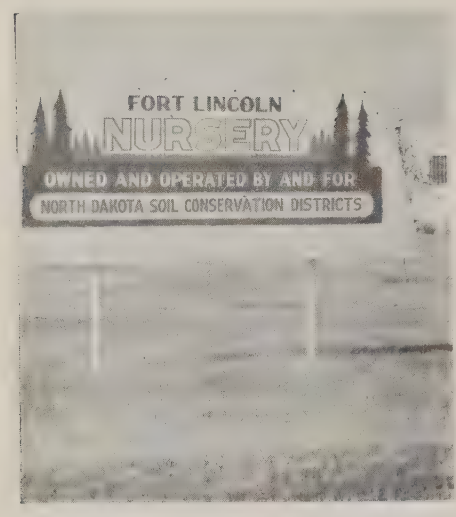
ENOUGH trees to plant two 5-row windbreaks across North Dakota grow every year on the two nurseries owned and operated by North Dakota's soil conservation districts. Moreover, enough grass seed is grown annually to plant a 75-foot wide strip of grass between the two State-long windbreaks.

Since the farmer-run nurseries began operations at Oakes in 1948 and Fort Lincoln in 1953, they have produced approximately 40 million trees and shrubs, and some 200,000 pounds of grass seed. These plant materials all have been used for conservation purposes on North Dakota farms and ranches.

The operation of the two nurseries was not undertaken because the district supervisors wanted to get into the nursery business, which they did not; but they did face a problem posed by a shortage of tree-planting materials of desired quality adapted to the area.

The demand for trees that increased with the expanded organization of soil conservation districts soon exceeded the supply; and the soil conservation districts stepped into the breach with their nurseries, acquired from the Soil Conservation Service when it was

Note:—The authors are, respectively, chairman of the North Dakota Association of Soil Conservation Districts, Lansford, N. Dak., and plant materials technician, Soil Conservation Service, Bismarck, N. Dak.



required to drop its nursery operations in 1953.

The Oakes nursery was purchased in 1947 and started producing trees the next year. Land for the Fort Lincoln nursery was leased from the U. S. Government in 1953, when all federally owned and operated nurseries were sold or leased to private concerns or closed. In the summer of 1956, title to the land was transferred to the State of North Dakota. Overall supervision of the nurseries is furnished by the nursery board of the North Dakota Association of Soil Conservation Districts.

Foundation and registered grass seed is distributed to farmers and ranchers cooperating with soil conservation districts. This seed has substantially expanded seed production, and has provided adapted species for various conservation programs within the State. The nurseries provide trees, shrubs, and seed to soil conservation districts and other agencies and groups involved in soil conservation activities. It is district policy that tree production be confined to species adapted to field and farm windbreaks, recognizing that commercial nurseries meet the needs for ornamentals, conifers, and fruit and landscaping species.

Planting millions of trees each year, in hundreds of field and farmstead windbreaks, is no small job. It requires the organized effort of all conservation agencies in the State.

Meanwhile, it is becoming apparent, in the northern Great Plains, that disease and insect pests, climatic and soil conditions severely limit some species of trees and shrubs that have been used for a long time, and that new species or selections must be found to replace them.

Much of the work at the Soil Conservation Service's Bismarck Plant Materials Center on SCD nursery land is on this problem. Here, many species of trees, shrubs, grasses, and legumes are grown for testing and initial increase. Field plantings are made from varieties that show promise, to test their value in field and farmstead windbreaks, in wildlife habitat plantings, and on sites and soils with other special problems.

In a 12-acre increase block, many species of trees and shrubs are planted in small plots for testing and possible seed increase. They

Shrubs grown at Fort Lincoln nursery for field observational planting.

are tested for winter hardiness, drought hardiness, freedom from diseases and insects, rate and type of growth, and seed- or fruit-producing abilities. If a species looks promising, seed is collected, or cuttings are made, from which small amounts of seedlings are raised at the plant materials center. These seedlings are used for field evaluations over a wide area.

Sources of tree and shrub selections are the Northern Great Plains Field Station at Mandan, the Horticultural Experiment Station at Cheyenne, Wyo., and the Experiment Station at Morden, Canada. Other sources are the Plant Introduction Center at Beltsville, Md., State agricultural colleges, nurseries, other plant materials centers, and field collections.

Fort Lincoln SCD nursery at Bismarck, N. Dak., (in background).

The Center furnishes stock for a variety of field evaluations. Among these are potting of conifers for better establishment, geographic strain studies for determining their range of adaptability, different compositions and spacings for single-row windbreaks and "skirt" plantings.

Pine, cedar, and spruce are potted to protect the roots. They are potted one spring and held until planting time the next spring.

Collections of seed of native species are made throughout the Great Plains States and sent to the Bismarck Center for increase. When the seedlings are ready to plant, they are distributed to experiment stations, colleges, and Great Plains soil conservation districts for further testing.

Different trees and shrubs are used alone and in combinations in single-row windbreaks, with varied spacings within the row, to determine the best combinations and spacings. Extensive patterns have been established in the Finley Soil Conservation District, and other plantings are being planned.

Some old windbreak plantings do not have a shrub row on the north, the windward side. This unprotected space allows the wind and snow to drift through. In order to correct this situation, work is being done to see if a shrub or conifer row can be established. A number of species of shrubs are planted in the same row on the north side of established windbreaks, to determine which is the easiest to establish under existing shade and competition.

Districts receiving seedlings for field evaluations keep records on survivals, drought, cold, insect, rodent, or disease damage, and rate and type of growth. Species that do not show up well are discarded. Those that show excellent performance will be increased through the soil conservation district and commercial nurseries for further distribution.

Sand Erosion—

Plants To the Rescue

By Wilson O. Hill

SPECIAL conservation plants are helping lick coastal and inland sand erosion on the Atlantic Seaboard in New England.

With his heavy construction equipment, man now rivals Nature on the rampage. He destroys vegetation, bares subsoils, and constructs huge, artificial soil areas. Manmade critical areas include borrow pits, mine spoil dumps, and hydraulic fills. Nature compounds man's mismanagement of the land by creating sand blows and other problem areas.

Many critical areas can be stabilized by applying mechanical and vegetative conservation measures, or combinations of them. Soil Conservation Service plant materials technicians are concerned with developing new plant species and varieties, and with grass establishment techniques which will effectively stabilize now troublesome areas. This observational plant materials work is conducted in cooperation with interested State and other Federal agencies.

Among the problems being studied are large areas of sand exposed or deposited by wind, or pumped hydraulically into fills for building sites and highway elevations. These sands usually are infertile, droughty, and highly erodible.

The Service's Northeast Plant Materials Center at Big Flats, N. Y., develops and supplies the seeds and plants of new strains for testing on New England problem areas. Those proved valuable are maintained at the Center in blocks. Then seeds or plants are furnished to cooperating commercial nurseries and seed producers.

More than 200 species and strains of grasses, shrubs, and trees have been established in Rhode Island in cooperation with the State's Agricultural Experiment Station. They are being jointly evaluated for survival, growth, and erosion-control performance. These field evaluation plantings are made on frontal dunes, back-dune areas, and hydraulic fills forming large sand plains.

American beachgrass has proved to be the best grass of those tested. Old, decadent stands of beachgrass have been rejuvenated into healthy stands by applying 400 to 600 pounds of 10-10-10 fertilizer. On many stands, 40 to 60 pounds of available nitrogen (N) gave just as good results as a complete fertilizer. Fertilizer gave best results in early spring applications.

Divisions of locally dug beach-

Beach panicgrass on sand blow at Whately, Mass.

Note:—The author is plant materials technician, Soil Conservation Service, Amherst, Mass.

3-year-old plot of fertilized American beachgrass.

grass clumps have been successfully established by planting three to five culms to the hill. The best results were obtained where divisions were dug and planted in March and April, but good stands resulted from plantings from October through May. Summer plantings, without irrigation, usually resulted in poor survival.

Additional sand-dune area field evaluation plantings are established on Massachusetts' Cape Cod, at Sandy Neck (town of Barnstable), and on the U. S. Fish and Wildlife Service's Monomoy Refuge. At Sandy Neck, the plantings are established and let go with minimum maintenance. Japanese black pine has established itself well in the back-dune areas, but only where planted in existing stands of beachgrass.

At Monomoy Refuge, plants for duck and goose pasture are being studied with Ralph Pellitier, refuge manager. These plantings are adjacent to dugout ponds in an interior sand-dune area.

Sand blow field evaluation plantings are being observed at Whately, Mass., in cooperation with the Agricultural Experiment Station of the University of Massachusetts. Grasses, shrubs, and trees have been evaluated for their growth, cover, spread, and persistence. American beachgrass and Vancouver dunegrass are the most rapid spreaders, and provide good initial stabilization. They have spread over adjacent grass plots when fertilized with 1,000 pounds of 10-10-10 an acre a year. Reed canarygrass has performed best of the tame hay-type grasses seeded on this site.

Beach panicgrass is a strong bunch grass that has stood up under winter snows at Whately better than any other grass during the last 4 years. In the spring of 1961, it was the only grass standing erect and affording good game cover on the Whately sand blow after a severe winter.

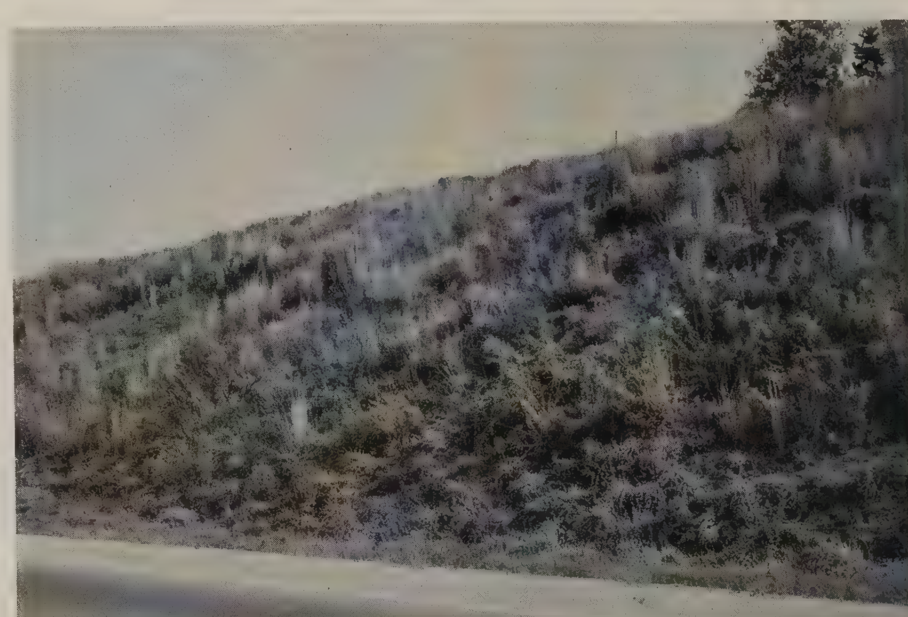
Plants that do well at Whately are tested further in seedings and plantings on a sand blow field evaluation site at Lyndonville, Vt., to measure their winter hardiness and growth at low-fertility levels.

Weeping lovegrass has proved successful along the coastal areas of Connecticut, Rhode Island, and Massachusetts as far north as Cape Cod and adjacent islands. It has established well, provided stabilizing cover, and persisted when seeded on protected beaches, sandbanks, highway median strips, dune sands, and deep hydraulic sandfills. Some stands are 12 to 14 years old. Farther north in New England, it winter kills.

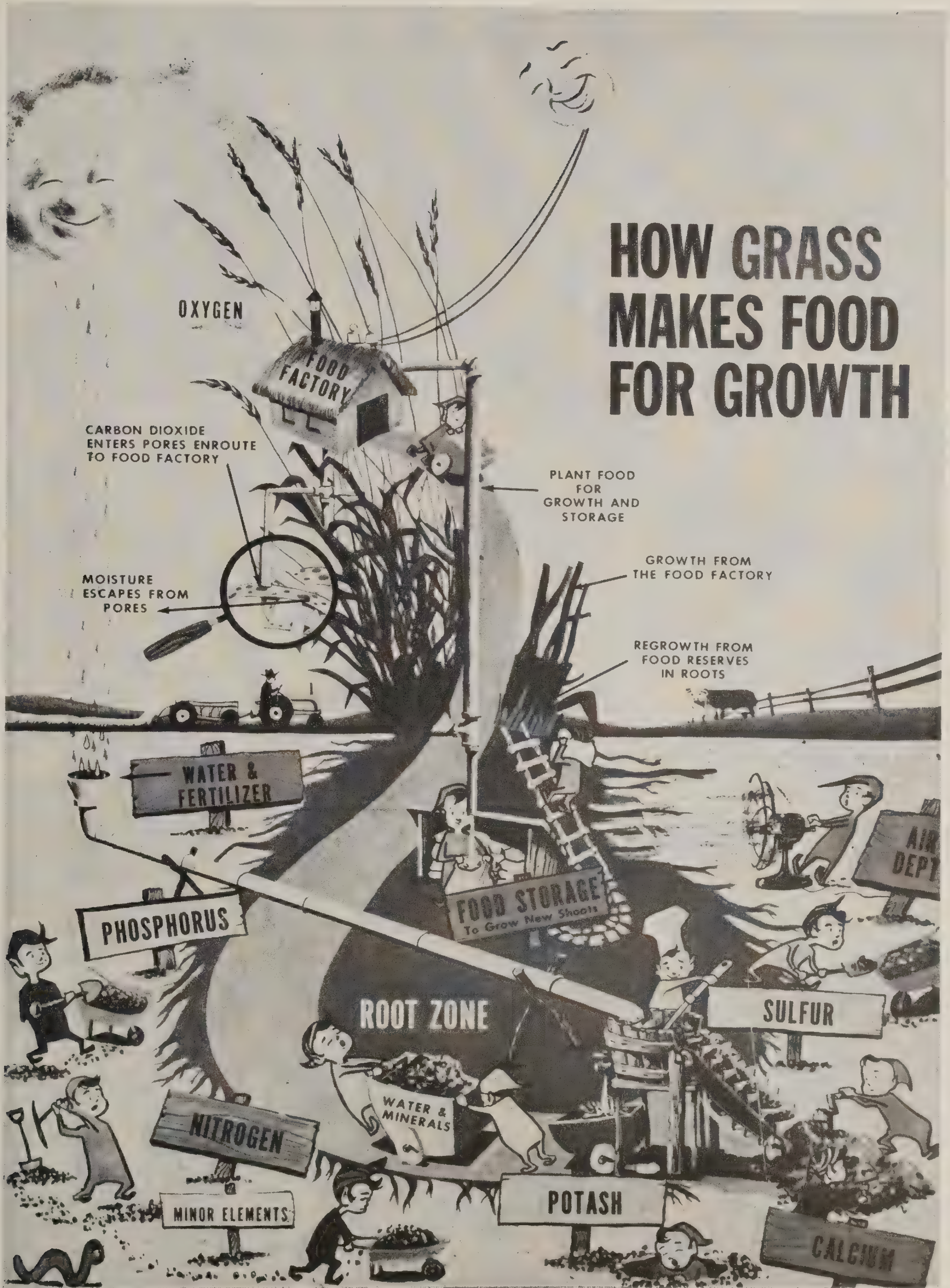
Blackwell and Nebraska 28 switchgrasses are growing well on sand blows in the Connecticut Valley, on sandy flood-control dikes, and in plantings made cooperatively by the Massachusetts Division of Fisheries and Game on a sandy game management area on the Plymouth burn.

Crownvetch has proved to be excellent protective cover on highway banks, gullies, and streambanks. Once established, it forms good cover and persists well in northern New England, even on the droughty sands. It is spring-seeded at 20 pounds an acre, and mulched with 1½ tons of straw to the acre. Reed canarygrass may be used effectively on the lower part of the banks, where flooding precludes the use of crownvetch.

Autumn olive is a versatile shrub for wildlife food and cover plantings on critical areas. It has survived even on sandy Cape Cod areas flooded by storm-driven, salt water, and has produced fruit regularly under those conditions.



Chemung crownvetch in volunteer grass resulting from pre-seeding straw mulching of roadside bank near Manchester, N. H.


HOW GRASS MAKES FOOD FOR GROWTH
OXYGEN
FOOD FACTORY
CARBON DIOXIDE ENTERS PORES ENROUTE TO FOOD FACTORY
PLANT FOOD FOR GROWTH AND STORAGE
MOISTURE ESCAPES FROM PORES
GROWTH FROM THE FOOD FACTORY
REGROWTH FROM FOOD RESERVES IN ROOTS
WATER & FERTILIZER
AIR DEPT
FOOD STORAGE To Grow New Shoots
PHOSPHORUS
ROOT ZONE
SULFUR
WATER & MINERALS
NITROGEN
MINOR ELEMENTS
POTASH
CALCIUM

Mojave Desert Windbreaks

By Harold Loudermilk

Wind erosion on Mojave Desert farm.

NOT all tree windbreaks or "shelterbelts" are grown in the Great Plains! For example, when high winds are whipping across the Mojave Desert in California, and soil is drifting from unprotected lands, ranchers are happy to have the soil erosion prevention and crop protection of their windbreak plantings.

A total of 114 miles of windbreak trees have been planted by ranchers cooperating with the Mojave Desert Soil Conservation District since its formation in 1951.

Strong winds often cause severe damage to young plants, cutting them off by sand movement and soil drying. Trees slow down the wind and aid materially in starting new crops, which in turn provide additional protection to the land. Growing crops also receive protection until after harvest.

A good planting of windbreak trees around the farmstead also helps keep buildings warmer in winter. It also helps prevent soil blowing. Livestock, which would otherwise be subjected to cold winds, likewise is protected.

Actual measurements have proved that the velocity of the wind is reduced greatly on the protected side of a windbreak. A windbreak 40 feet high reduces the speed of the wind by one-half at a distance of 500 feet. With such a windbreak, the wind velocity is reduced for almost the entire length of a 40-acre field.

Each year, Mojave district directors sponsor the sale of planting stock for windbreaks to farmers and ranchers in this area, to encourage the establishment of windbreaks for conservation of soil and water. Some income from tree sales is provided to the district to help carry out other phases of its conservation program.

The trees are grown at the Antelope Valley Soil Conservation District Nursery at Little Rock, Calif. It is owned and operated by the district, to supply district cooperators with good planting stock of adapted varieties of trees and shrubs. The planting stock includes: Arizona cypress, Tamarisk (athel), Allepo pine, coulter pine, black locust, honey locust, Chinese elm, hybrid poplar, Arizona ash, and fruitless mulberry.

2-year-old athel (tamarisk) windbreak to protect alfalfa field on Arthur M. Preble property in Mojave Desert SCD.

Low winter temperatures prevent the use of varieties damaged by cold. Athel trees grow well in salty soils and under other adverse conditions, such as low fertility and infrequent irrigations. Under more favorable conditions, many ranchers prefer to plant Arizona cypress, an evergreen.

Trees are planted in the fall or early spring, in the bottom of a large furrow that provides protection for the young trees, and is used for irrigating them. The elm, locust, and mulberry are planted 12-15 feet apart in the row. Athel and cypress are spaced 6-10 feet.

Athel plantings are made with cuttings from branches of older trees, which many ranchers obtain in their local areas. Athel trees planted on the ranch of District Director Kenneth Hill have grown to a height of 25 feet in 6 years. One and one-half miles of athel tree windbreaks are now growing on his ranch. One-fourth mile of trees protect the farmstead.

Note:—The author is work unit conservationist, Soil Conservation Service, Victorville, Calif.

Coastal Bermudagrass

Proves Self in West

By Ray W. Bates

THE value of Coastal bermudagrass for erosion control under unfavorable conditions has been added to its already recognized utility as a superior forage plant in Arizona. Its high yield, deep root system, and palatability have made it a popular pasture grass under irrigation. Now its erosion control value also has been demonstrated.

To find the suitability of Coastal bermudagrass for erosion control, a planting was made in 1957 at Rancho Del Lago, near Vail, Ariz. The grass was planted on a site typical of many in both the Pima County and Santa Cruz County soil conservation districts.

They are drainageways which carry runoff water from rangelands through the irrigated valleys and into the main stream channels. Most of them carry large amounts of water during a short period of high-intensity rainstorms; and erosion is active, because most of the drainageways are unprotected.

At the time of this planting, little was known as to how Coastal bermudagrass would respond when planted on these sites, which are less favorable than those on which it formerly had been grown. Thomas H. Childers, operator of Rancho Del Lago, and the Soil Conservation Service technician assigned to the Pima County district worked out a field-size planting plan. The Plant Materials Center at Tucson provided enough sprigs to plant 9 acres.

Typical unimproved waterway.

Irrigating Coastal bermudagrass.

The waterway was constructed in the spring of 1957, by widening the existing channel and building a dike on each side, to a total of 5,815 feet. The bottom width of the waterway was 75 feet.

The ground was smoothed, and the bermudagrass sprigs were spread over the area and covered by making furrows about 15 inches apart along the bottom and sides of the dikes, to catch and hold water, especially along the sides of the dikes.

The grass was planted in June 1957, and sprinkler irrigated immediately. From planting time until December 1959, however, only two additional irrigations were applied, although virtually no rain fell on the planting during 1959.

The planting was on fairly sandy soils, in an area that ordinarly receives about 11 inches of rainfall a year, at 3,100-foot elevation. By December 1959, there already was a good grass cover on both sides of the dikes.

This successful planting indicates that Coastal bermudagrass will grow in this area with only occasional supplemental irrigation, once it has been established, and, with sufficient water and good management, will provide an abundance of forage as well as do a good job of erosion control. As Childers uses most of his irrigated lands for pasture, this planting works in well with his operations.

Note:—The author is area conservationist, Soil Conservation Service, Tucson, Ariz.

Coastal bermudagrass after grazing by cattle.

Better Plants and Pastures

By Harry J. Haynsworth

Typical flatwoods land before pasture improvement.

THE search for new and better plants to fill many and varied soil and water conservation needs is an unending task in southern Florida's "flatwoods" area as it is elsewhere.

It is impracticable or next to impossible for farmers, ranchers, or citrus grove owners to find, test, and select plants to meet their individual needs. They need these plant materials in sufficient quantities for reasonable size plantings, along with necessary planting and other information.

To help meet these needs in the subtropical Gulf and Atlantic coastal areas of the Southeast, a Plant Materials Center was located at Arcadia, Fla., with soil conditions typical of the area. A deep, droughty, sandy soil on the east end slopes to an area of "flatwoods" type soil, and the west end of the property slopes sharply to a low, wet area.

Overhead irrigation is used on the droughty soils during extended dry periods; and the "flatwoods" type soil has a system of ditches and structures for drainage in wet seasons or for subsurface irrigation when needed. The low, wet area is used for evaluation and production of plants needed under such conditions.

The Center is concerned with assembling, selecting, testing, and providing useful plant materials, required cultural and management techniques, and yield information. Plant materials are assembled from many sources, such as other Soil Conservation Service centers, Agricultural Research Service plant introduction stations, and agricultural experiment stations, and through SCS field collections.

More than 1,100 plant accessions have been received since the Center was established in 1957. They are planted first in rod rows and observed for a year or longer.

Many observations and comparisons of the plants' growth and other characteristics are made to judge their usefulness. More than a score of these plants have shown enough promise to justify study beyond that in rod rows or small plots. These have been planted in 600-foot rows to increase seed or vegetative material for use in block or larger plantings. Comparative block plantings with "standards" for recommended species or varieties are made. Other plantings may be necessary to develop seeding, harvesting, and other information.

Plants proving better than standards, or those showing promise in filling a special need, are increased for planting on selected off-the-Center sites, mainly in soil conservation districts, to determine their range of use and performance under field conditions. One, for example, is East Indies bristlegrass *(Setaria barbata)*, planted in full-canopied citrus groves, where there is need for a cover and erosion-control plant that can be grown in dense citrus tree shade and in coffee plantations in Puerto Rico. If the off-Center plantings prove out, enough seed of the accession

Rod-row plantings at SCS Plant Materials Center, Arcadia, Fla.

Note:—The authors are, respectively, manager of the Plant Materials Center, Arcadia, Fla., and State plant materials technician, Palmetto, Fla., both of the Soil Conservation Service.

For Florida's "Flatwoods"

C. B. Blickensderfer

then is produced at the Center for release to commercial producers, with a foundation stock maintained at the Plant Materials Center.

Fifteen years ago, white clover was almost unheard of in south Florida. Today, thanks to the plant materials work of the SCS, there are thousands of acres of white clover and grass pastures in this area, which have meant much to the State's growing cattle industry. The Range Cattle Station at Ona pointed the way.

Complexities of soils, fertilizers, and minor elements, plus inadequate winter moisture, made it hard to establish clover. But SCS soil scientists, engineers, plant technologists, and other technicians, working as a team, recognized its possibilities and tackled the job.

They chose soils with a rather high water table and an impermeable layer in the soil structure, which permits an artificial water table to build up when water is applied. Because the legume cannot stand long flooding or survive on overly wet soil during the growing season, flood protection and drainage were needed. Yet water had to be supplied to regulate the water table during periods of critical moisture deficiency.

The SCS technicians worked out plans for smoothing the land, for ditches to facilitate both drainage and irrigation, for dikes to protect the land from flooding, and for water-control structures in the ditches and a supply of irrigation water from ponds or wells. The plant technicians, agronomists, and work unit conservationists provided information on the cultural requirements of white clover, and set up guidelines for managing this new type of pasture.

The flatwoods comprise a large acreage in south Florida. It has been used as rangeland since Hernando DeSoto's time, 421 years ago. When new pasture grasses, such as Pangola and Pensacola bahia, were developed in the 1930's and early 1940's, it was found they could be grown on such lands. When beef prices were high in the 1940's and early 1950's, many ranchers found it profitable to clear the rangeland in blocks of 100 to 400 acres, or even more, for improved pasture planting.

These pastures increased the rate of stocking from one cow on 25 acres to one cow to the acre, under good management. But when beef prices got tight, it became apparent that, in order for the ranchers to stay in business, they had to do something more than boost their beef production.

It was at this point that SCS technicians decided to try white clover, to reduce the amount of fertilizer needed by grass pastures and to extend their spring-through-fall grazing period through the winter. Clover, with grass, held the answer. It requires cool weather, the right amount of moisture, fertilization and good management. There was moisture, but it often was not available when and where needed. Sometimes there was too much. SCS technicians and engineers came up with a combination of ditches that drain off the surplus water of the wet summer and deliver water needed during the dry winter. Through the control structures, an artificial water table can be built up; thus the soils have water available for plants during dry periods.

Such has been the evaluation of the so-called water-control systems now in common use throughout south Florida. As a result, more grass-clover pastures are being planted and managed the conservation way. They often yield enough year-round grazing to fatten two to four steers to the acre!

Water held during dry season seeps from ditches to grass and clover land between ditches on Hart Ranch at Sebring, Fla.

CROWNVETCH—

New Pasture Legume

By Virgil B. Hawk and Donald S. Douglas

CROWNVETCH has become well known as a ground cover and erosion controlling plant. Now it is coming into its own as a forage legume for land treatment in conservation farm plans.

Probably introduced into the United States as an ornamental plant, crownvetch has "gone native" in many places in the Cornbelt. It persists around old farmsteads long after the buildings have been torn down. These "wild stands" occur primarily on well-drained, calcareous soils in unplowed areas. Plant materials technicians of the Soil Conservation Service have made many collections from these old stands for comparative evaluations at plant materials centers.

Crownvetch is a perennial, rhizomatous legume with beautiful pink flowers. These characteristics fostered its use for erosion control on roadbanks. Crownvetch was at first thought to be unpalatable and not useful for grazing. It has a bitter taste and, like sweetclover, livestock may avoid it until they develop a taste for it. Where cattle had access to field plantings established primarily for bank stabilization, crownvetch was grazed. Observations led to comparative field plantings of crownvetch and either birdsfoot trefoil or alfalfa in grazed pastures; and evidence accumulated to date indicates that crownvetch has possibilities as a permanent pasture legume.

A decade ago when the Croy watershed on the Little Sioux Flood Control Project in western Iowa was under construction, the Lamb brothers seeded a steep bank to crownvetch and bromegrass, with the rest of the field seeded to alfalfa and bromegrass. The field was grazed by beef cattle. Alfalfa

Emerald crownvetch.

lasted under grazing about 5 years; and today only bromegrass and a spreading patch of crownvetch remain. This persistence of crownvetch under grazing is closely related to the performance of several "wild stands" of crownvetch in the Cornbelt that have been grazed for years.

A coal company in Ohio is the most extensive user of crownvetch for forage. It has established stands on about 2,500 acres of strip mine spoil. The pasture is used by feeder stock as summer grazing, producing 125 to 150 pounds of gain to the acre for the season.

Bill Lounsbury, a pioneer producer of Emerald crownvetch seed in the Story County Soil Conservation District in central Iowa, has pastured his seed fields both in early spring and after seed harvest. This system helps reduce the volume of growth for seed harvest, and makes for more uniform bloom and seed set. Harold Deters, another Iowa seed grower, was unable to harvest his seed crop one year. He found that his dairy cows readily utilized the mature crownvetch.

Several other Illinois and Iowa district cooperators have compared crownvetch with birdsfoot or alfalfa for pasture. Generally, these

Jess Scholl checks Emerald crownvetch after close grazing by cattle in Jasper County, Iowa.

Note:—The authors are, respectively, plant materials technicians, Ames, Iowa, and Milwaukee, Wis., both of the Soil Conservation Service.

plantings were too small for production data, but they did demonstrate the palatability and persistence of crownvetch under grazing.

Many strains of crownvetch have been tested and compared. At the SCS plant materials centers and cooperating experiment stations in the Cornbelt, a strain tested as M2-10215 consistently has been the most vigorous and best performing selection. It recently was named "Emerald crownvetch" and released by the Soil Conservation Service and the Iowa State Experiment Station. Other available varieties are Penngift, which was developed in Pennsylvania, and Chemung, which recently was released in New York State.

Most plantings of crownvetch in the past were made on cuts, fills, eroded banks, and mine spoils. Generally, they were rough seedbeds on weedy or infertile sites; thus, crownvetch has picked up a reputation for slow establishment. But when planted on farmland, good stands of crownvetch can be obtained by using sound planting, fertilizing, weed control, and other techniques.

Other adapted legumes and grasses sometimes are planted with crownvetch to give production and ground cover the first season or two. Crownvetch soon shades and dominates the other plants, tending to become a pure stand.

As with other legumes, a grazing system that allows the plant to reach bloom stage sometime during the season is essential for stand maintenance and high production. Such a system involves dividing pastures into units that can be rotated. Bloat or other serious grazing difficulties have not been found to be a problem.

Cattle seem to prefer crownvetch to other legumes near the end of the grazing season; and it is acceptable as standing hay until it is covered by snow.

Cooperator Don Caltrider in his Guthrie County SCD Emerald crownvetch plot that produced 300 lbs. of seed an acre in 1961.

Something Different on the *Plains*

By James E. Smith, Jr.

CHANGES in the agriculture of the High Plains of Texas come often. But few of them have been as dramatic as the almost explosive expansion in the production of seed of native and introduced grasses.

Irrigated side-oats grama ready for seed harvest on Cecil Brashear farm near Lubbock, Tex.

Only a few acres in 1955 were producing seed of a few grasses. By 1961, grass seed of 20-odd species had become a major cash crop from about 5,400 irrigated acres of land of more than 140 soil conservation district cooperators in that part of the State.

These men were attracted to seed production for various reasons: It fit well into a conservation cropping system with cotton, called only for use of ordinary row-crop machinery already on hand, and offered a chance for greater financial return than that to be expected from growing grain sorghums. Most of the new producers had no previous experience in growing grass under cultivation, but many did an outstanding job in spite of this handicap.

A similar development took place in some of the other Great Plains States, but nowhere has reported production equaled that of seed growers in western Texas—especially in the Lubbock vicinity.

For example, Walter Gray, who farms near Littlefield, started in 1956 with plantings of Blackwell switchgrass, ElReno side-oats grama, and Indian grass. He later added Plains bristlegrass, green sprangletop, sand lovegrass, Arizona cottontop, Woodward sand bluestem, Caddo switchgrass, and Premier side-oats grama. In the beginning, Gray followed a general schedule of water and fertilizer applications suggested by Soil Conservation Service technicians assisting the Lamb County Soil Conservation District. As he gained experience he changed the

Note:—The author is plant materials technician, Soil Conservation Service, Temple, Tex.

schedule to meet needs of the individual crops.

He found that an early spring application of 40 to 50 pounds of nitrogen, plus 50 pounds of phosphoric acid to the acre—with lesser amounts added for the second or third seed crops—resulted in top yields from the shorter grasses. The tall, late-maturing grasses produced best seed yields from a late spring application of about 100 pounds of nitrogen and 80 pounds of phosphoric acid an acre. He also learned early in the game that control of thrips in side-oats grama is necessary for best seed set.

Gray's yield of market quality seed was more than 400 pounds of switchgrass an acre, 600 pounds of side-oats grama, 500 pounds of Indian grass, 600 pounds of Plains bristlegrass, 700 pounds of green sprangletop, 750 pounds of sand lovegrass, and about 550 pounds of Arizona cottontop. Irrigation water needed in addition to rainfall varied from about 24 inches for side-oats grama to 12-18 inches for the tall grasses.

Gray's ability to produce high yields of grass seed was duplicated by many growers at other locations. Supplies of a few species and strains were actually in excess of the demand that existed at the start of 1961. But, also for the first time, seed was available in sufficient quantity and variety for widespread range and pasture plantings in the area.

In 1961, like a number of other growers, Gray reduced his seed production acreage and turned to cattle to utilize the forage on his remaining fields. As he puts it:

"I'm hanging onto stands of those grasses that require more than one season to reach full seed yields. While temporary seed surpluses exist, I figure I can make a good profit from grazing these irrigated grass fields. With cross-fencing and rotational use of Indian grass and switchgrass, I'm hoping for at least 400 cow-days of grazing an acre from them."

Cecil Brashear of the Idalou community near Lubbock is another who successfully started a similar seed production program in 1956, with Blackwell and Caddo switchgrass. Since then, he has added Vaughn and Premier side-oats grama, Woodward sand bluestem, Cheyenne Indian grass, Plains bristlegrass, and Grenville switchgrass. His grass fields are handled in a cropping sequence with cotton, of no longer than 3 or 4 years of grass and 4 or 5 years of cotton.

"My cotton yields after grasses are usually about the same as continuous cotton the first year, three-quarters of a bale or better the second and third years, and between a quarter and third of a bale more on into the fifth year," Brashear says. "And these yields are produced with fewer irrigations each season than required by continuous cotton."

At present, only a small part of his farm has not yet grown at least one grass crop. Whether the grass is grown for seed, or for hay and grazing, he believes the High Plains cotton farmer cannot afford to leave grass out of his cropping system.

Seed supplies of some grasses have not yet reached present needs in Texas. Still, as a result of the accomplishments of men like Brashear and Gray, landowners in a large part of the State now can choose grasses adapted to their localities for erosion control and grazing. Land conversions planned under Great Plains Conservation Program contracts are moving forward smoothly, because dependable supplies of the right kinds of grass are at hand, and their use can be scheduled in advance.

◆

Irrigated switchgrass on Walter Gray farm at Littlefield, Tex., at end of grazing period before cattle moved onto field in background.

The 11th International Land, Pasture, and Range Judging Contest will be held on May 3 and 4 in Oklahoma City. More than $2,000 in cash awards, trophies, and medals will be presented winners in 4-H club, FFA, collegiate, adult, and foreign divisions. A new feature this year will be the adult division, open to men, women, and girls who cannot qualify in other divisions. About 25 States, supplemented by a delegation of foreign visitors, usually participate in the contest, sponsored by WKY radio-television of Oklahoma City, Oklahoma State University, and a number of agricultural groups and agencies.

Gullied outer slope of strip mine spoil in Barbour County, W. Va.

New Plants For Alleghenies,

Strip Mine Spoils and Shale Soils

By Joseph D. Ruffner

NEW conservation grasses and legumes promise to speed up protection of highly erodible strip mine spoils and boost forage production on shallow shale soils in the Allegheny Mountain region.

Strip mining in this mountainous West Virginia-Maryland-Pennsylvania area results in long, steep, bare slopes left on the outer edge, or downhill side, of the strip. Up to now, nearly all planting on such land has been to trees. Though generally used black locust grow faster than most species and give the best cover, even they take 4 to 8 years to stabilize these eroding slopes.

There accordingly is need for both temporary and permanent cover plants that can be established and maintained from direct seeding on these strip mine spoils. The Soil Conservation Service, through its Plant Materials Center at Big Flats, N. Y., is carrying on a continuing program of observational plantings with the object of finding and developing the best plants, both for the strip mine and shale soils. The main factors determining adaptability of plants to spoil land are its acidity and low fertility.

The shallow shale area, with its problem of inadequate cover and low forage production, despite the fact that a high percentage of this land is in pasture, lies within and to the east of this mountainous region.

''Chemung'' crownvetch, selected for its vigor and high seed production, has been recognized as being particularly well suited for use on roadbanks, streambanks, and critical areas on farm and rurban areas where a plant for erosion control and land cover that requires the least care and attention is desired. So it is not surprising that it has demonstrated itself to be an outstanding species in providing cover on the less acid spoil banks. Although sweetclover will provide cover sooner, it is not as permanent or as effective as crownvetch, which becomes progressively more dense and, so far, has not been damaged seriously by insects or disease.

This legume has shown remarkable erosion-control ability. Be-

Note:—The author is plant materials technician, Soil Conservation Service, Morgantown, W. Va.,

Garrett County narrowleaf trefoil on shallow shale soils in Potomac Valley SCD, Moorefield, W. Va.

sides being deep rooted and rhizomatous, it produces a loose, live vegetative mat 2 to 4 feet deep, that provides soil protection during the winter.

Both "frost" seedings and conventional seedings have been successful. Frost seedings are made on the steep spoil outer slopes where seed-bed preparation is impossible. Neither lime nor fertilizer is used. Seedings with conventional farm equipment are made on leveled spoil; and some, fertilized, have produced 100 percent cover in 2 years. Frost seedings on unfertilized, limy spoil will produce good stands in 3 to 4 years, depending upon the fertility of the spoil. Seedings on moderately acid spoils have taken the longest to produce stabilizing cover.

In 2 years' test on shallow shale, Chemung crownvetch also has outstripped all other legumes in herbage and cover production.

A new crownvetch strain, tentatively named "Pendleton," found growing in the problem observation area, shows promise as a palatable hay and pasture legume. Seed of this strain is not yet available; but it is under seed increase at the Big Flats Center, and soon will be added to evaluation plantings.

"Garrett County" narrowleaf trefoil is another legume under observation that has proved to be exceptional for its ability to produce vigorous stands at low-fertility levels. On the dry shallow shale soils, it appears superior to all other trefoils as a pasture plant; and frost seedings in heavily grazed native mountain pastures also have been promising. It also has shown good adaptation to strip mine spoil.

"Tualatin" tall oatgrass is one of the more promising species on spoil banks and shallow shale soils, being well adapted to the moderately acid spoils of low fertility, where it has been a better seed producer than any other grass, as well as to the shale soils, although it is not too well suited as a pasture grass. By the summer of 1962, twenty new accessions of tall oatgrass will be included in evaluation plantings on both of these problem areas. A new strain, NY-867, introduced at the Big Flats Center looks particularly promising.

Several exotic bluestems appear to be adapted better to tolerating midsummer droughts than are some of the native western grasses. Both Caucasian bluestem and King Ranch bluestem, for example, have produced good stands with fairly dense cover on shallow shale soils.

Pendleton crownvetch before mowing for hay on Raymond Cowger farm in Potomac Valley SCD, Franklin, W. Va.

2-year-old Blackwell switchgrass cover on leveled strip mine spoil bank in Monongalhela SCD, Morgantown, W. Va.

Swithgrass, especially the Blackwell variety, is another of the better native species for high limy spoils too steep or stony for using cultural practices, producing good stands by the second year. Its bunch-type growth, large size, and abundance of seed make it a desirable grass for wildlife food and cover on spoil banks.

Indian grass from the Great Plains also has performed favorably on acid spoil banks in southern West Virginia, of which it is a native, where good stands have been obtained on outer slopes by frost seedings.

◆

"Planning for a Nation's Water—Stage I" is the theme of the 9th National Watershed Congress to be held May 7-9, 1962, at the Deshler Hilton in Columbus, Ohio.

◆

The 1962 Soil Stewardship Week will be May 27–June 3. The theme is "Water—the Stream of Life."

GARRISON CREEPING FOXTAIL—

A New Grass for Wetlands

By John McDermand and Jesse L. McWilliams

A re-discovered grass brought to America by early immigrants is proving its conservation value in converting unproductive northern Great Plains wetlands to high-producing hay and pasture lands without disturbing their role as spring nesting areas for waterfowl. Its use also has been extended into the Corn Belt.

It is Garrison creeping foxtail *(Alopecurus arundinaceus)*, which rapidly is gaining favor as a hay and pasture grass for shallow potholes and swampy areas in North Dakota and South Dakota and in mountain meadows of Montana and Wyoming.

Information from old-time residents is that this grass was brought into the area from eastern Germany or western Russia by early immigrants during the homesteading days.

The initial seed for this grass was collected in 1950 by the Soil Conservation Service from plants growing around a pothole near Max, N. Dak., and increased at the Service's Bismarck Plant Materials Center. Garrison creeping foxtail seed subsequently has been distributed to several soil conservation districts in the Dakotas, Montana, and Wyoming for field plantings. Some seed also has been distributed to districts in the central Corn Belt States from an increase planting at the SCS Plant Materials Center at Elsberry, Mo.

Although this grass is particularly adapted to wet lowlands and other poorly drained soils, it has done well under irrigation and on dryland where annual precipitation is 18 inches or more. Because of its vigorous rhizomes, it competes well with low producing sedges and rushes that are common on wetland soils. Its advantage is that it produces profitable forage that can be harvested in dry summer months while leaving the wetlands on which it is grown undisturbed by drainage and consequently available for waterfowl nesting and food in the wet spring season. Reed canarygrass is another grass that long has been used by conservation farmers in this northern Plains area in the same way.

Garrison creeping foxtail (dark heads) ready for seed harvest in Clark County, S. Dak.

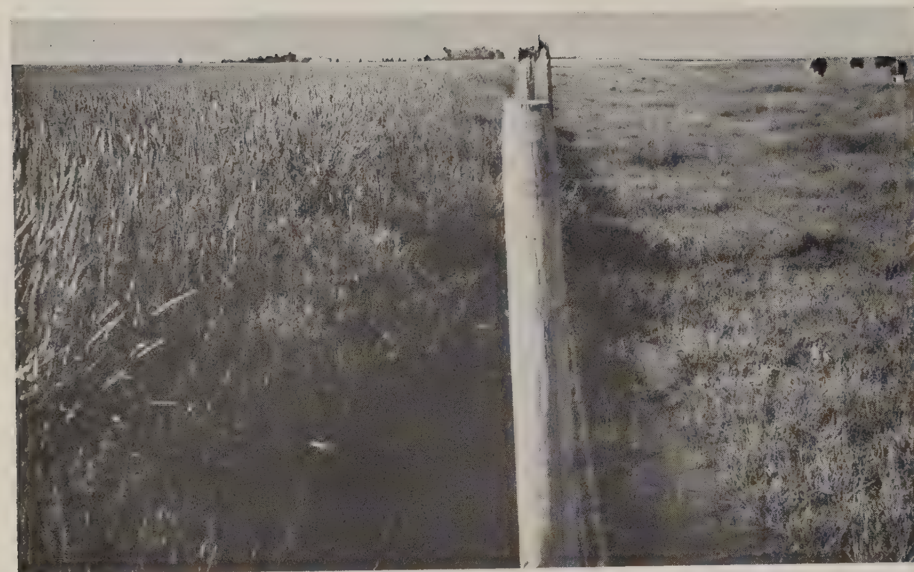
Garrison creeping foxtail does well on wetland soils that are nonalkaline and nonsaline. It is a tall, cool-season grass which resembles common meadow foxtail, but has broader leaves. The seed heads turn black at maturity, and individual spikelets fall away easily, making seed harvest difficult.

It repeatedly has demonstrated its ability to withstand flooding for a considerable time without serious damage. Twice since it was established, a planting on the John Leiferman farm near Kimball, S. Dak., for example, has been inundated for several months, and none of the stand has been lost. As Leiferman says: "This grass spreads even faster than reed canarygrass, and, although reed canarygrass usually makes more tonnage, the quality and palatability of the Garrison creeping foxtail is much better."

Glen and Arthur Ault of Cavalier, N. Dak., who have three fields of this grass on their farm say: "We harvest the seed first, which

Stacks of Garrison creeping foxtail hay on E. H. Hackerott ranch at Midland, S. Dak.

Note:—The authors are, respectively, plant materials technicians, Soil Conservation Service, Bismarck, N. Dak., and Casper, Wyo.



Garrison creeping foxtail (left) contrasts with native wet meadow on Lester Holden ranch near Valier, Mont.

is usually ready about July 4 to 10. As the seed heads are well above the leaves, we cut as high as we can. Then we cut the forage, bale it, and feed most of it to our young dairy stock. It has been better than any hay we have, including brome and alfalfa. They clean up every bit of it, and do better than on other hay. Reed canarygrass harvested at the same time is not as palatable to dairy stock. The Garrison foxtail competes well with quackgrass, and comes up right through water in the spring in shallow potholes."

Garrison creeping foxtail has one of its greatest potentials in the mountain meadow areas. Short growing seasons and an excess of water preclude the use of forage plants such as alfalfa, smooth brome, and orchardgrass on many of these meadows. Garrison creeping foxtail starts growing early in the season, and can produce two cuttings of hay in these short-season areas. Yields comparable to smooth brome and intermediate wheatgrass were obtained in field tests on the Roy Sims ranch at McFadden, Wyo., and on the I. G. Sheffy ranch at Boulder, Wyo. Performance has been equally good on plantings in the South Fork Valley in Park County, Wyo., and in the Big Hole area of Beaverhead County, Mont.

Many unproductive wetland areas on farms and ranches can be converted to high-producing hay and pasture by reseeding with Garrison creeping foxtail. Seed is in short supply; but additional seed production fields are being established, and the supply soon should be adequate. This variety has been approved and released for certification in Wyoming.

Nevada Land Responds To Grass Improvement

By **Aage S. Topholm**

GORDON and Kay Kirkeby led the way in proving that the poorer soils on eastern Nevada ranches can be put to more profitable use.

Back in 1953, all the Kirkebys were growing was saltgrass, rabbitbrush, and greasewood. How to improve the forage on these soils was their problem.

The Kirkeby brothers' ranch is the base for a range-livestock operation. Their ranch consists of 219 acres of cropland and 1,400 acres of brush and saltgrass pasture. A portion of the pasture is covered with a dense stand of saltcedar. They could run about 600 head on their public range allotment during the summer. But their own land would not sustain the 600 cattle if they had to be brought in during a poor range year. The Kirkebys knew they had to do something to improve their home pastures.

The Kirkebys have been cooperators of the White Pine Soil Conservation District since 1950. After studying the soil conditions, Soil Conservation Service techni-

Note:—The author is soil conservationist, Soil Conservation Service, Wells, Nev.

cians working with the district advised that tall wheatgrass should grow on the land they had in mind. The brothers decided to try it on a fairly level 10-acre field that was subirrigated.

The SCS obtained enough seed from the Plant Materials Center at Aberdeen, Idaho, where this grass had been tested and found superior to other grasses growing on "salty" land, for a field-size planting. In the fall of 1953, the native growth of saltgrass and rabbitbrush was plowed under. The saltgrass sod was so tight the Kirkebys had to go over the field several times with a heavy disk plow in order to chop the sod. After the sod had decomposed, it was disked twice to firm the seedbed.

2-year-old tall wheatgrass replaces saltgrass on this field on Kirkeby ranch.

The field was seeded in 12-inch rows, 12 pounds to the acre, in November. By the summer of 1954, it was evident they would have a good stand of grass, and the Kirkebys bought enough seed to plant an adjacent 28 acres. The field for the new seeding was plowed in the fall of 1954 and seeded in 1955.

By mid-August 1956, the first seeding was well established, and the plants were vigorous, even in the worst alkali spots. The second seeding, although not as good as the first, also was doing well, despite the fact that the subirrigation in this field was low. The tall wheatgrass thus showed it could withstand dry conditions. It was ready to graze by that time.

"We put 55 steers in the field for more than a month," Kay Kirkeby recalls. "They made a better gain than the cattle on the saltgrass pastures."

The steers liked the tall wheatgrass so well that it was all cleaned up except the heavy stubble. In each succeeding year since the first grazing the grass received less moisture, because of drought; but despite this condition and yearly grazing, the grass continued to maintain its vigor.

The Kirkebys feel that the forage value of the tall wheatgrass well exceeded the $610 cost of establishing it on the 38 acres, or about $16 an acre.

The annual amortized cost of $610 for 10 years at 5 percent interest showed an annual cost of $79 an acre for the seeded land. This, plus $38 for yearly fencing cost, makes a total annual cost of $117 an acre. The average annual income for a 10-year period would be $234. This amount, less $117 for annual expenses, would give a net return of $117.

Continuing their program of increasing forage on the low-producing pastures, they now have 55 acres of tall wheatgrass and 15 acres of giant wildrye. Other cooperators in the White Pine district have visited the Kirkeby ranch to see the tall wheatgrass seedings successfully grown on poor alkali soil. As a result, there has been an increase in the use of tall wheatgrass on poor soils on several ranches in the district.

The Kirkeby brothers cleared tall wheatgrass land of saltgrass and saltcedars like these.

8000 Acres in Woody Plantings For Nebraska Wildlife

By Charles V. Bohart

WOODY plants for wildlife food and cover are among the most important plant materials used by farmers and ranchers in soil and water conservation and treatment. Nebraska provides one concrete example.

Late in 1940, Nebraska Game Forestation and Park Commission wildlife specialists recognized the need for improving wildlife cover. They were particularly interested in winter cover for pheasants, an important game bird in a large part of the State, and for another prized resident of many areas, the sportsmen's beloved bobwhite quail.

In both cases, there was need for providing cover that would carry the birds through the winter and thus assure brood stock for the next year. With a relatively small amount of publicly owned land in Nebraska, the specialists realized that any program would have to be acceptable to private landowners. A program demonstrating how woody plantings could be used to conserve wildlife and other natural resources appeared to be a sound approach to this problem.

A Habitat Restoration Program was set up by the Game Commission in 1947, with Federal aid provided by Pittman-Robertson funds. Because the Soil Conservation Service works with large numbers of landowners through State-sponsored soil and water conservation districts, a cooperative agreement was established between the Service and the Game Commission, whereby the Service helped by reporting sites suitable for plantings.

When assisting a district cooperator with his farm and ranch planning, SCS technicians called attention to the benefits of the program, and explained how help could be obtained in developing plantings for wildlife. The Game Commission took over from there.

Wildlife developments in the State now exceed 6,000 and total more than 8,000 acres. Included are more than 800 miles of multiflora rose hedge, among other wildlife-benefiting measures.

In the initial stages of the program, sites were fenced, prepared for planting, planted, and cultivated for 2 years. The plantings then were turned over to the landowners for maintenance. Replanting stock was provided when needed.

The composition and layout of individual areas were worked out by the technicians of the Game Commission. Most plantings were for winter cover. One of the requirements was that the plantings have sufficient "depth" to trap snow and still provide good cover within the area.

Another phase of the program provided for establishing multiflora rose hedges, primarily in the bobwhite country. Many of these hedges are on the contour. They divide fields and provide living fences. Others are used as field boundaries, and winter cover plantings oftentimes are surrounded with multiflora rose.

As the program continued to increase in popularity, more responsibility for developing the areas, including fence construction and planting, was turned over to landowners. Site preparation and cultivation by the Game Commission were discontinued. The Commission, however, still provided planting stock and fencing materials.

When available, additional planting stock was furnished to improve existing field tree windbreaks and livestock shelter. Because of its value to wildlife, some planting stock was provided to encourage landowners to make

Contour multiflora rose hedge bordering alfalfa field provides bobwhite travel lanes and protection near Syracuse, Nebr.

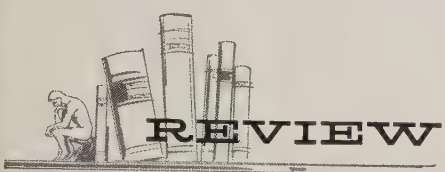
Note:—The author is biologist, Soil Conservation Service, Lincoln, Nebr.

Wildlife planting around farm pond near Kearney, Nebr., also reduces shoreline erosion and evaporation.

new plantings of this type.

The early plantings included Scotch and Austrian pine, frost grape, green ash, black locust, honey locust, hackberry, American elm, buffaloberry, common lilac, caragana, dwarf ninebark, spirea, silverberry, and alder buckthorn, More recent plantings have included red cedar, ponderosa pine, Russian olive, choke cherry, black cherry, American plum, honeysuckle, three-leaved sumac, cotoneaster, Nanking cherry, and sandcherry. Red cedar is one of the more important trees in wildlife plantings throughout the State, and multiflora rose is valuable in the quail area. The species now being used proved more adaptable and have specific wildlife values. Several of them were advanced for conservation use by Soil Conservation Service plant materials centers and their predecessor Service nurseries.

Woody plants that provide food and cover for wildlife and that are adapted to Nebraska conditions are now available from commercial sources at reasonable prices. New varieties of woody plants for special uses still are being grown in field trials by the Soil Conservation Service and the Nebraska Game Commission. Part of the cost of establishing windbreaks and erosion-control plantings, all of which have wildlife values, may be borne under a cost-sharing arrangement with the County Agricultural Stabilization and Conservation Committees.



PRINCIPLES OF PLANT BREEDING. By R. W. Allard. 485 pp. Illus. 1960. John Wiley & Sons, Inc.: New York. $9.

THIS book is written primarily for undergraduates in agriculture. Although dealing mainly with principles of plant breeding, specific examples from many different crops are given to avoid abstractness.

All plant improvement, we are told, rests on sound biological principles. Natural and artificial selections have been at work a long time. Modern plant breeders have received the end products of a long period of natural selection under cultivation.

If some of the chapters seem a bit technical to the reader, it is because some of them were written for students having a special interest and required background in plant breeding. The text is written in such a way that a number of the chapters that may not interest the reader can be skipped without seriously affecting the understanding of other chapters. Furthermore, a glossary at the end of the text helps the reader to grasp the meaning of technical terms that the author finds necessary to use in a field of technology where terms with precise meaning must be employed. Selected references at the end of each chapter are useful to obtain additional information on subjects under discussion.

Since it deals with the principles of plant breeding, the book is applicable to all phases of plant work, and therefore would be a valuable addition to any plant technologist's library. The author writes in a clear style and uses simple terms in explaining the parts of plants that are instrumental in plant breeding. He lists self- and cross-pollinated crops and describes the mechanisms used to improve plants by controlled pollination.

One entire chapter is devoted to hybrid varieties, describing the many scientific discoveries that were made and the years it took to perfect methods that eventually led to the production of many kinds of disease-free, high-yielding crops. These discoveries had a tremendous impact on crop improvement; hybrid corn is a good example. Other chapters deal with methods and techniques that today are successfully employed by the modern, well-trained plant breeder.

—A. D. Stoesz

WEED CONTROL: AS A SCIENCE. By Glenn C. Klingman; Editorial Assistance by Lyman J. Noordhoff. 406 pp. Illus., index. 1961. John Wiley & Sons, Inc.: New York.

This is a college textbook on the use of chemicals to control un-

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wanted plants. It also may serve as a reference manual.

Its 24 chapters cover the subject in four phases: The first 4 chapters are devoted to background on the weed problem, the ways plants respond to different kinds of herbicides, and the relation of these chemicals to the soil; 3 chapters cover the use of surfactants and equipment: 7 chapters describe the 7 chemical groups of herbicides in prevalent use; and 10 chapters set forth use recommendations by plant groups such as vegetable crops, brush and trees, and aquatic plants, with one devoted to soil sterilants.

The discussions of the herbicides themselves seem very thorough to this reviewer, who is not a chemist, and include what might be termed the ecology'' of the chemicals. For example, among the phenoxy compounds is the well-known 2, 4-D. This father of the modern herbicides, itself less than 20 years old, is discussed under these subheadings:

Characteristics; marketed forms; precipitate formation; volatility; micro-organisms; persistence in soil; absorbtion by plants; translocation; relation to plant maturity; effect on plant respiration; effect on plant-food reserves; effects on enzymes; stomates and turgor pressure; histological changes and plant twisting and culvature; and effects on man and animals, given as negligible when 2, 4-D is applied at recommended rates. Other herbicides are treated less fully, in proportion to how much is known about them.

Reference to weed species is largely incidental in the sections on the herbicides. Weeding of crop fields, grasslands, home grounds, water areas, and woody plant cover is described in special chapters. To the credit of the author, priority is given to performing weed control through cultivation, crop rotations, use of clean seed, mowing, mulching, and other cultural methods. It is gratifying that control of aquatic weeds in ponds is recognized as beginning with proper pond construction.

This is a treatise on the use of chemicals, and primary attention is given to them. Such comprehensive treatment of a complicated and rapidly developing field is most welcome.

—FRANK EDMINSTER

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GRASS POSTER:—The ''How Grass Makes Food For Growth'' poster reproduced on p. 201 is available, in color, in 26″x38″ wall size from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. (15¢); and single copies in 9″x16″ pocket folder size from any Soil Conservation Service office without charge, or from the Superintendent of Documents for 5¢ each.

Have You Seen?---

- ''Latar Orchardgrass for Conservation in the West.'' by J. L. Schwendiman, Donald S. Douglas, and A. L. Hafenrichter of the Soil Conservation Service, released by the U. S. Department of Agriculture as Production Research Report 54. Latar's use, how it developed, how and when to seed it, rates of seeding, seed production, and management of establishment stands are featured in the leaflet.

- ''How to Control a Gully,'' by C. J. Francis, Soil Conservation Service, published by the U. S. Department of Agriculture as Farmers' Bulletin 2171, superseding Farmers' Bulletin 1813, ''Prevention and Control of Gullies.'' Some of the methods described for controlling gullies are proper water disposal, natural revegetation, planting trees or grass, and building temporary or permanent dams or other structures.

◆

Nematodes, parasites so small they can't be seen, attack some 400 or 500 different kinds of plants and cost farmers in many States thousands of dollars a year. They stunt and reduce yields by burrowing into plant roots and sucking the plant's juices.

MAY 1962

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

Soil Conservation

25 Years Ago

"Soil and water conservation is not an end in itself, but a means by which a nation can preserve natural resources, control floods, prevent impairment of reservoirs, maintain the navigability of rivers and harbors, protect public health and public lands—all of which are in the interest of public welfare."

•

"Flood waters and silt loads do not stop at farm boundaries, nor at county lines, hence the need for community action on a watershed basis . . ."

•

"Invariably, through rain after rain, the effectiveness of good vegetal cover in reducing run-off stands out in a most striking manner at these centers of study (erosion control experiment stations). The quantitative determination of the influence of sodforming crops on run-off and soil losses, as compared with losses from intertilled crops, is undoubtedly one of the major contributions to modern agricultural science."

COVER PICTURE—A deceiving "pretty picture." Actually it shows a final stage of destructive soil erosion—confirmed by the National Inventory of Soil and Water Conservation Needs still to be the No. 1 problem on the Nation's agricultural lands.

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ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

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FRANK B. HARPER, Editor

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Conservation Needs Measured

By Donald A. Williams

EVERY business from the corner grocery to the largest manufacturing plant takes yearly inventory to obtain precise information on its assets and a measure of new stocks or materials needed. Yet our Nation has not until recently had any comprehensive tally of its productive assets—soil and water—of replacements needed for those resources it had used up, or of future demands upon those remaining.

Soil and water conservation needs still are numerous and urgent in all too many places, despite the great progress the Nation's land users have made the past quarter of a century in dealing with them. The cover picture of this issue was taken in 1961—not 25 years ago!

In 1956, the U. S. Department of Agriculture undertook, in cooperation with other Federal, State, and local agencies and nongovernmental interests, a National Inventory of Soil and Water Conservation Needs. Its objective was to assemble accurate facts on current use of land (1958 inventory date) for cropping, grazing, and woodland, to obtain dependable estimates of land-use changes by 1975; and to get a realistic measure of the remaining conservation job on non-Federal agricultural land.

Finally, it was to make available practical information which everybody, from a local planning commission to a soil conservation district to a community watershed organization, could use in blueprinting land- and water-use programs. This unparalleled study of these basic resources, and of the specific attention that needs to be given to them, has been completed. Its findings are being published and put to use in counties and States throughout the country, by agricultural, rural community, rurban planning, and other chiefly local interests.

Today, as a result of the needs inventory, we have the best picture we have ever had of this Nation's privately owned land and water resources—and of what we need to do to assure their future production of food and fiber, wildlife and recreation, and other essentials in the abundance needed by tomorrow's growing population. We attempted in the past to gather somewhat comparable information, as in the pioneering national soil erosion reconnaissance survey made in the mid-1930's, and the estimates calculated in the early 1940's of soil and water conservation measures still needing to be applied on the land.

But this is the first time we have had information on land capability and conservation needs from detailed surveys, scientifically distributed across the entire country, to give a uniform degree of reliability in the results. And it is the first time we have had information on present land use derived from physical examination of the land itself. The results thus are unique in the fields of soil surveys and land-use statistics. Their value is multiplied, because more than 30,000 people, thoroughly acquainted with local conditions and trends, physical and economic, took part in the inventory, in 3,000 counties.

Selected features of the needs inventory can be compiled in many ways to serve special or local purposes. We can, for example, make a summary for a particular river basin or watershed. A regional planning agency could make special arrangements to have the land-capability data for a group of counties summarized. An irrigation equipment manufacturer or a trade association could finance a county-by-county tabulation of the acreages of soils suitable for irrigation or other purposes in its territory.

The conservation needs inventory, in other words, was no idle statistical exercise. The demonstrated and potential uses of the data marshaled by the study are limited only by the needs and imagination of its users, agricultural and nonagricultural.

Up to now, our overall land balance has kept handily ahead of our drafts upon it. With about 6 percent of the world's land area, including about 18 percent of its arable land, and 7 percent of the world's population, we still have 3⅔ acres of cultivable land per capita; and we have not approached the foreseeable limits of our capacity to increase production, through scientific technological improvements.

However, finding enough land room and water to meet our rapidly growing agricultural, recreational, and other needs depends as never before upon sound scientific approaches to these problems in this space age. We cannot afford—if we ever could—to rely upon rule of thumb methods of managing these resources. This newly pinpointed knowledge concerning our soil and water resources and needs ahead will help us to their most productive and efficient use, and to a more satisfying future for the Nation and all of its 185-plus million citizens.

30,000 People Helped Measure

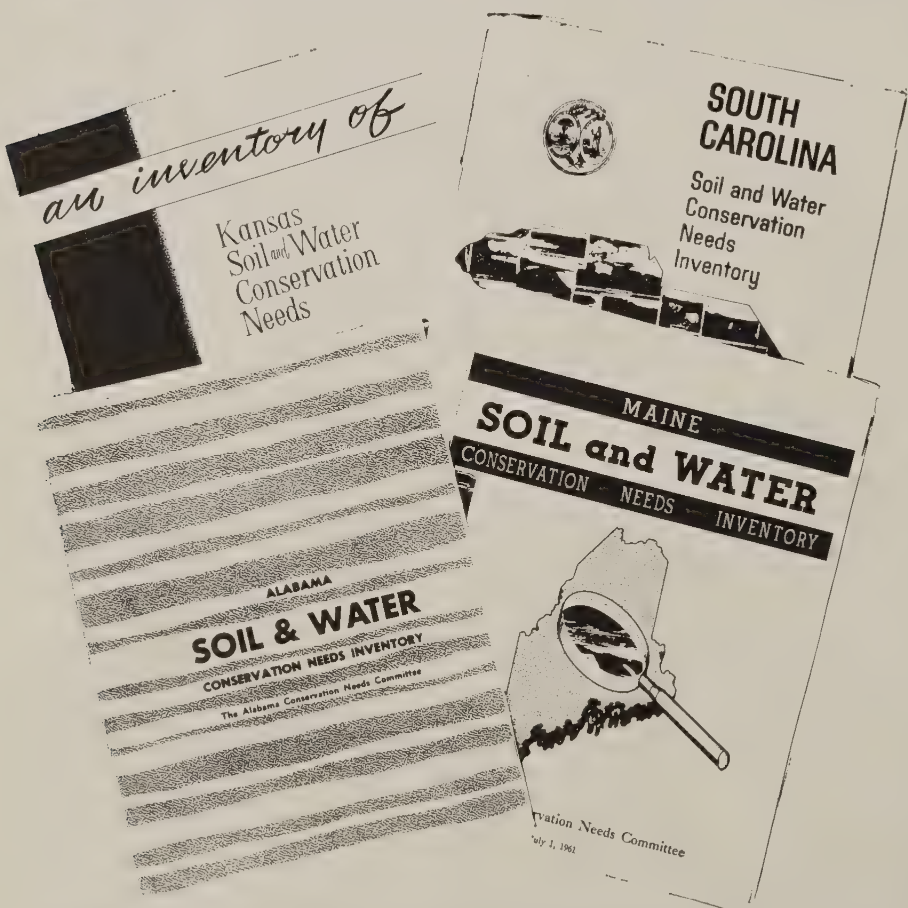
NATION'S CONSERVATION JOB AHEAD

By John W. Barnard

ON-THE-GROUND local information is essential to measuring the soil and water conservation job ahead in any area or for the country as a whole. Such a measure of that job is available in the recently completed National Inventory of Soil and Water Conservation Needs, for which some 30,000 competent people in the fields of soil, water, and related resources contributed facts and judgments in 3,000 counties.

The inventory, conceived as early as 1956 and based on 1958 conditions, was designed to provide facts about our land and water resources, problems in their use, and estimates of treatment they need. Such facts, collected on a systematic basis, long had been needed for better planning of farms, ranches, and watersheds, as well as for use in county, State, and nationwide programs ranging from rural area development to rurban planning to recreational developments. With such information, both private and public interests today are thus in position to develop programs that will better provide for our needs for food, fiber, wood products, recreation, and wildlife.

The inventory was carried out by national, State, and local committees. The Department of Agriculture Committee is made up of representatives of the eight agencies that have responsibilities in land and water use, management and conservation; because the lands included in the inventory are those for which Congress has authorized departmental programs. Close liaison was maintained with the Department of Interior, as certain lands under their management, such as Indian lands, were included.



Representative soil and water conservation needs State inventory reports.

Membership of State and local committees included, in addition to representatives of other Federal and State agencies, State and local organizations concerned with resource conservation. Their broad background of knowledge and assistance proved invaluable, both in making the study and in the reliability and usefulness of its findings.

Assumptions on population, food, fiber, and other requirements were made by the Department committee, supplemented by information on conditions and trends in the States and counties. Basic information on land use and soils was given by the Soil Conservation Service, as part of its soil survey.

Standard soil surveys were made on sample area plots selected by the Cornell University and Iowa State University statistical laboratories. Measured data were placed on punch cards and expanded to counties. Completed soil surveys for many counties were a source of additional information. Data from at least 40 million acres of soil surveys supplied basic information. The Census of

Note:—The author is soil conservationist, Soil Conservation Service, Washington, D.C., and chairman USDA Soil and Water Conservation Needs Inventory Committee.

Agriculture, the Forest Service's Timber Resources Review, Agricultural Stabilization and Conservation Service studies, and other sources of information were drawn upon to show the most reliable picture possible of current land use.

The basic soils and land-use data were interpreted in terms of current land use by land-capability units for the use of county committees, which in turn estimated changes in land use expected in their counties by 1975. The committees then estimated, on the basis of local records, the acreages of land needing conservation treatment, and of that already adequately treated. The land uses considered were those of cropland, pasture and range, forest and woodland, and other lands such as those in farmsteads and wildlife areas. In the 17 Western States, Hawaii, and Puerto Rico, irrigated cropland was separated from other cropland. Perhaps the most accurate figure on small water areas available anywhere is in the inventory, which also developed figures on urban and built-up areas, and watersheds of 250,000 acres or smaller.

Conservation treatment needs for cropland were expressed in terms of dominant problems such as erosion, excess water, soil conditions, and climate. Pasture and range and forest and woodland estimates were related to conservation of grass or trees as well as the soil resource.

Watershed project needs were related primarily to departmental authorities under the Watershed Protection and Flood Prevention Act, Public Law 566, but not limited to it. The inventory provides information on the nature and scope of water-management problems which require action through local units of government such as soil conservation districts, watershed districts, irrigation districts, and towns.

Although the inventory of land use, conservation problems, and acreage needing treatment did not include Federal lands, except cropland, the watershed inventory covered all lands in the Nation as authorized by Public Law 566. The inventory involved some 1,438 million acres of non-Federal land in the 50 States.

The uses of the inventory are numerous and cannot all be listed and evaluated here. One of the major values of the inventory lies in the fact that the basic data were assembled in such a way that they will be useful for many years.

Needs Inventory—Facelifting ℞ For Manmade Wrinkles On the Land

By T. C. Green and T. A. Neubauer

HOW deep the unnatural manmade wrinkles on the country's land face will be a decade and a half hence well may be decided by a thorough diagnosis of its "facelifting" needs which is now available.

This is the county-by-county report of the National Inventory of Soil and Water Conservation Needs just now being completed by the U.S. Department of Agriculture under Soil Conservation Service leadership. The result is detailed factual information now available on the Nation's current land and agricultural water use and, most importantly, what its land and water users need to do by 1975 to insure the stability of these resources.

The long-contemplated conservation needs study, made by people best informed on the physical and economic conditions and trends in their counties, has given us for the first time the answer to these basic questions:

1. How much of the privately owned land in the country is used currently (as of the 1958 inventory date) as cropland, range and pasture land, forest and woodland, or for miscellaneous purposes such as farmsteads and wildlife areas?

2. What will be the comparable land uses in 1975?

3. What are the main land-use problems on these lands—erosion, excessive water, condition of the

Note:—The authors are soil conservationists, Soil Conservation Service, Washington, D.C.

Flood damage in 1961 on Campbell Creek at Tad, W. Va.

soil?

4. How much of the land in each of these uses needs conservation treatment?

5. What kinds of treatment are needed on grasslands and on woodlands?

6. What are the country's water sources in small streams, lakes, and ponds?

7. How many watersheds smaller than 250,000 acres are there in the United States, and how many of them need treatment through projects such as those now being developed by local-State-Federal action through the Watershed Protection and Flood Prevention Act?

All, of course, are directed to the main objective of measuring the size and nature of the soil and water conservation job needing to be done on the country's farms and ranches and in its agricultural watersheds, as indicated by the expected land uses in 1975.

Actually, the inventory indicates there will be extensive shifts in land use from 1958 to 1975, toward more grassland, recreation, and nonagricultural uses. These include those areas principally affected by the shifting of land from agricultural to nonagricultural uses—to a net total of about 15 million acres for the country as a whole by 1975. The task of dealing with erosion and related soil and water problems, however, is shown to be of major proportions. It involves initial conservation treatment of those lands still needing treatment, and continuing maintenance of conservation practices on all land that has conservation problems.

The needs inventory tells us that in the 48 mainland States about 272 million acres of cropland expected in 1975 needs conservation treatment. About 161 million acres of the cropland needing treatment has soil erosion as the dominant problem. Similarly, excess water is the dominant problem on 60 million acres needing treatment, unfavorable soils on more than 36 million acres, and adverse climate on about 14 million acres.

The four types of problems considered in the inventory occur in various combinations. Cropland on which erosion is the main problem, for example, in many cases also has unfavorable soils, excess water, or climatic problems—or all three. That on which stony, alkaline, or otherwise unfavorable soils for crop production comprise the main problem also may have erosion, climatic, or even excess water problems. And so on.

Ray Hecksel farm near Watertown, Minn., is a pleasing example of the results of conservation "facelifting."

The inventory did not consider conservation practices that might be used in treating croplands. The kinds of treatment needed depend upon the land's prevailing problem, how the land is handled, and the kind of crops grown on it. Approximately 136 million acres, or 31 percent of the total cropland acreage, already has been treated with conservation measures and is considered to be protected adequately from deterioration. Another approximately 28½ million acres has no special problems that limit its use.

About one-third of the Nation's non-Federal agricultural land, or 485 million acres, is included in the pasture and range category. This is the largest of the four classes of land which were delineated in the inventory. About one-fourth, or 27 percent, of the pasture and range does not need conservation treatment.

Of the 364 million acres of pasture and range that does need treatment, about 72 million acres needs establishment or reestablishment of grass cover, more than 107 million acres needs improvement of the cover, and about 185 million acres requires protection from overgrazing, fire, erosion, rodents, and the encroachment of noxious plants. Most of this land is in the States west of the Mississippi River.

Included in the forest and woodland areas inventoried was 450 million acres of privately owned land which is at least 10 percent stocked by forest trees of any size and capable of producing timber or other wood products, or which has an effect on the waterflow in streams. Nearly 69 million acres, or 16 percent, of the total area needs tree planting or natural reseeding.

About 160 million acres of the forest and woodland needs improvement of the timber stands. Nearly half of it needs more adequate protection from insects and diseases, and about 252 million acres, or 57 percent of the total, needs protection from fire. More than 12 million acres needs protection from erosion.

More than 60 million acres of farmsteads, idle land, wildlife areas, and other areas closely associated with agricultural use was inventoried. Even though about 98 percent of this "other land" has a conservation problem of some kind, only 10.4 million acres, or 17 percent, of it needs treatment and is feasible to treat.

The watershed part of the inventory included all lands, whether privately, federally, or otherwise owned. It shows nearly 13,000 small watersheds as being of suitable size for projects under the Watershed Act or the Small Reclamation Projects Act. About 8,400 of these watersheds, including more than a billion acres, need project development.

Floodwater and sediment damage was found to be the most widespread problem calling for project action. About half the watersheds need projects to protect 62 million acres of flood plain lands. A third of them need projects to deal with critical erosion areas; a third need drainage programs, and a sixth need irrigation facilities.

Specific needs for recreational facilities were identified in 2,000 watersheds, and for municipal and industrial water-supply development in 800. As in the case of cropland problems, watershed project needs frequently overlap in the same watersheds; and opportunities for developing multiple-purpose projects are numerous. The inventory data also will be useful in relating upstream watershed treatment with downstream developments.

Kentucky Watershed's Farmers Count on "Needs" Information

By Charles W. Ford

FARMERS in the Mud River watershed in western Kentucky are counting heavily on newly available local soil and water conservation needs inventory information to help them in planning and applying the best possible measures on their land lying above watershed flood-prevention dams.

Using the needs estimates of what it will take to care for the land and improve it, landowners and operators are moving ahead with their plans to use such measures as contouring, terracing, and tree planting for watershed protection over a period of 5 years. The Soil Conservation Service is providing technical help through the farmers North Logan Soil Conservation District, a cosponsor of the watershed project, which includes one combination flood-prevention and recreational dam.

Take contour stripcropping:

"It saved the fertilizer I put on my land as well as preventing soil loss," said L. E. Stinson, owner of 212 acres of typical farmland in the 240,000-acre Mud River watershed, of his own 35 acres of this new practice in the watershed. He is a longtime North Logan district cooperator.

Since he laid out his stripcropping in 1959, other farmers have followed suit, until stripcropping in this area has grown to 273 acres. It is not yet an imposing figure, but the fact that this practice is "taking hold" so rapidly shows that it fits. It also indicates that Logan County farmers are taking seriously their part in this community-improvement project. Another 1,025 acres of contour stripcropping will be needed, along with other conservation measures, in order to assure fullest protection from the watershed project.

Stinson (left) and SCS Technician Charles W. Ford look over his conservation farm plan.

Each of Stinson's cultivated strips is wide enough for 24 corn rows, with alternate strips of the same width in orchardgrass and lespedeza. All of his natural watercourses were developed as sod waterways, to carry excess water safely off the fields. They were seeded with Ky. 31 fescue, at the rate of 33 pounds an acre, with lime and fertilizer.

"I saved 15 percent on operating cost, gas, oil, and time," Stinson said. "I have less machine repair with rows all level and no gullies to cross."

As for the alternate strips, he added: "Well, I needed the hay."

Contour farming long had been practiced on Stinson's farm. He estimated that he already had cut his soil loss from 30 tons an acre to 12 tons by contour farming; but figures that now, with contour strips and a 4-year rotation, his soil losses should drop to less than 5 tons to the acre.

"I am sure my corn yield increased 25 percent the first year," he reported. "This alone is enough to keep me from returning to my former methods of cultivation."

Note:—The author is soil conservationist, Soil Conservation Service, Russellville, Ky.

Wisconsin Shows How

Needs Reports Can Be Used

By Edwin Hill

PLANNING bodies and schools are among the many users of Wisconsin's soil and water conservation needs reports already published by some 60 counties and expected to be put into print by all 68 counties in the State before the year is out. The individual county printing runs range from 1,000 to 5,000 copies.

The points of emphasis and circulation outlets for these inventory reports cover almost as wide a range as do the counties' indicated needs for future soil and water conservation actions. Take Vilas County, for example: The Conservation Needs Committee in this county hit upon a "Chamber of Commerce" type report which has been distributed widely, including in neighboring States.

Most Wisconsin counties now have their sights set on total resource planning, based upon master land-use plans that will be the base upon which to build overall economic development plans. Manitowoc County is an example:

The conservation needs figures on land expected to go out of agriculture pointed to the need for some type of control to use these changing acres wisely. The county board of supervisors appointed a technical advisory committee on land-use planning to advise township and county officials. The committee has worked with one township in formulating a land-use zoning ordinance.

"The land-use inventory and conservation needs report is the basic study necessary before any land-use planning can be intelligently done in the county," is the opinion of County Planner Charles Montemayer.

The Fox Valley Regional Planning Commission has asked the Soil Conservation Service for additional soils information; and the Southeast Seven County Regional Planning Commission, using the conservation needs information, has investigated the availability of standard soil surveys for guidance in land-use planning for other than agricultural uses.

At the annual meeting of the Wolf River Improvement Association, the executive secretary pointed out the value of the conservation needs study and the need for development of an overall regional land-use plan.

It is in Manitowoc County, also, that the conservation needs information is going to school. County Superintendent Armond Kueter reports that the needs report was used in planning a conservation education program. The conservation classes are geared to the local needs, which are outlined clearly in this document.

The report motivated the study of local conservation needs, in the field and in the classrooms, thereby bringing the pupils right to the specific problems instead of generalities in their study of conser-

Tile drain system and grassed waterway under construction on Lawrence Falk farm in Manitowoc County in 1960.

Note:—The author is assistant State conservationist, Soil Conservation Service, Madison, Wis.

vation. Manitowoc County's soil and water conservation needs booklet also has been included in the course of study for the annual 3-day out-of-door conservation workshop for teachers and conservation leaders.

Here are some other uses being made of the conservation needs information in the Badger State:

It has prompted contractors to explore the possibilities of buying tiling machines and earthmoving equipment. In at least one known case, a new tile manufacturing plant is being planned.

The conservation needs report in Outagamie County led the airport committee to request soils information on its proposed $2,500,000 airport.

The conservation needs inventory also has prompted many Wisconsin counties to expand the inventory to all of their resources. The Dane County report, "Blue Print for Growth," is one example.

Meanwhile, Wisconsin's conservation services are taking advantage of the opportunity to put the State's and locally developed soil and water conservation needs information to work in their programs. The Wisconsin Conservation Department, for example, has established a permanent Conservation Needs Committee, by areas. The goal is to keep the conservation needs information current.

"The joint effort in developing the conservation needs report provided wonderful training and experience for our people—foresters, game managers, and fish biologists," is the way State Forester John Beale of the Conservation Department summed up the use of the needs reports.

Those who have received Wisconsin county soil and water conservation needs reports include:

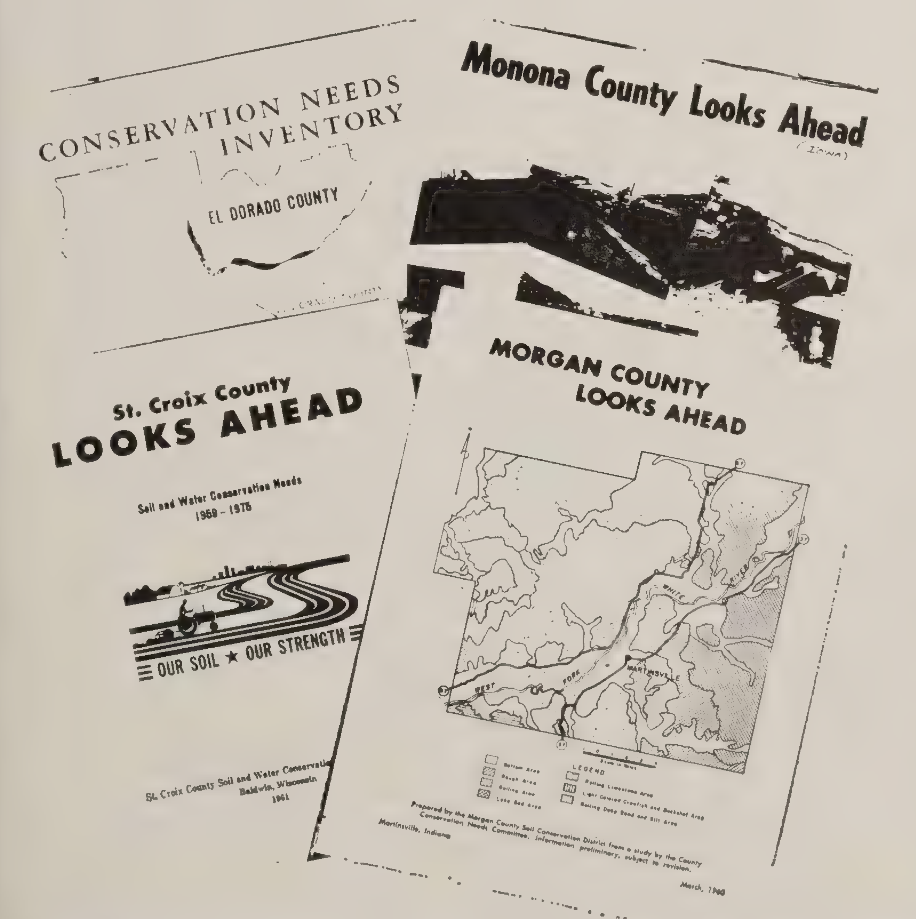
Women League of Voters, bankers, vocational agricultural departments, sportsmen's clubs, and teachers in high, grade, and parochial schools. Also, river improvement associations, all agricultural agencies, State resource agencies, and State, regional, and county planning commissions. Also, the State University and State colleges, science clubs, county board members, and feed, fertilizer and implement dealers, contractors, farmers at farm institutes, and the press.

Art Robers' dairy cattle thrive on alfalfa-bromegrass rotation pasture in Wisconsin's Kenosha County.

Not Just 'Til '75 —But For "Life"

D. W. Niendorf of Manitowoc reports in the Wisconsin State Soil and Water Conservation Committee's spring issue of "Soil and Water Conservation":

"A copy of the 1959—75 Conservation Needs publication was placed in the cornerstone of the recently dedicated Manitowoc County Jail and Traffic Center building. Maybe a century from now, someone one will review it, and use the information in planning programs far into the future."



Examples of county conservation needs reports. (St. Croix County, Wis., lower left.)

The Face of Rhode Island

A Dozen Years Hence

By Bernhard A. Roth and Robert E. Laramy

WHAT the face of Rhode Island will look like a dozen or so years hence is a matter of highest economic and social concern to all the people of the State. A dependable answer is to be found in the State's findings of the National Inventory of Soil and Water Conservation Needs.

Dwindling farmlands and other open areas already have greatly changed Little Rhody's landscape features in comparatively recent years. The inventory, based on painstakingly assembled local facts and calculations on the land and water resources of the thirteenth of the 13 original States, points to many further changes ahead.

The biggest single land-use change will be brought about by a continuing boom in housing, industrial, and commercial development. As the population explosion goes on in Rhode Island, as elsewhere in the Northeast, an area equal to 210 farms of 100 acres apiece will be taken up by such nonagricultural uses by 1975, as indicated in the State's inventory.

The net reduction in cropland acreage between 1958 and 1975 was shown as 13 percent, or from nearly 52,700 acres to about 45,300 acres. Broader land and water management needs and opportunities than those heretofore involved in the operations of dairymen, poultry raisers, stockmen, and cash-crop farmers lie ahead.

As land becomes increasingly important for uses in addition to farming, the public's interest in its management also becomes greater, and the conservation needs inventory information will be more valuable to all concerned with the State's natural resources.

How soil survey and other basic information like that developed by the inventory is being put to practical use in many ways, on the farm and off, is illustrated in different parts of Rhode Island. For example, soil maps are used in different localities in setting up planning and zoning codes made necessary by the State's rapidly growing population, estimated by the inventory to reach 1 million by 1975.

Thus the Johnson and North Smithfield planning boards recently called upon the Northern Rhode Island Soil Conservation District for this very kind of help. Soil Conservation Service technicians worked up special maps which community developers could use to determine areas most suitable for various types of development, including homes, industries, and public parks.

When a telephone company serving Rhode Island and other States started running its lines underground, it needed to know about the digging that would be involved. The company is making effective use of soil survey maps provided by the Service. They give workers excavating some 500 miles of trenches for the new cable advance notice of the rocks, sand, muck, and other obstacles that may be encountered.

At Lincoln, thoroughbred race horses are sleeker—and, it is to be hoped, faster—as a result of conservation pasture improvement. Owner B. A. Dario of Fair Oaks Farms, and president and treasurer of Lincoln Downs, applied through the soil conservation district for a conservation plan, including building of grass waterways, clearing land of stones, improving drainage of wet pasture

Contour planting on Savella brothers' nursery in Southern Rhode Island SCD.

Note:—The authors are field information specialist, Upper Darby, Pa., and assistant State conservationist, Storrs, Conn., both of the Soil Conservation Service.

Two Congdon boys try for "the big one" in marsh development pond on father's farm at West Kingston, R. I.

areas, and improving the quality of grass on the 500 acres. He finds his stable of high-priced runners thrive on conservation-treated pastures and are more durable for the racing season.

The needs inventory indicates that Rhode Island's pasture acreage will increase 10 percent by 1975, or from 21,000 acres to around 23,500 acres. Of this, about 19,000 acres will need conservation improvements like those on Fair Oaks Farms.

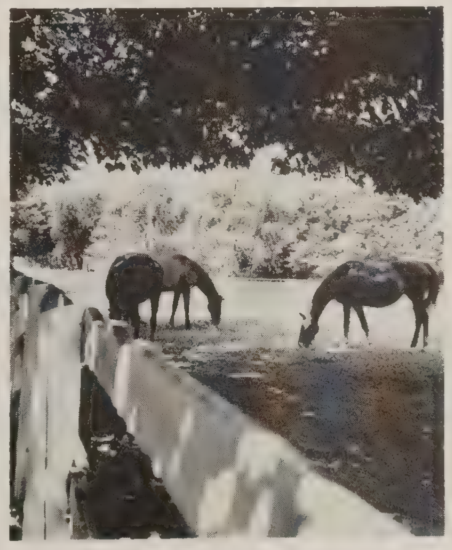
Wildlife also has a significant role in Rhode Island's soil and water conservation future. The State's thousands of acres of wetland since earliest times have been a mecca for migratory waterfowl along the Atlantic Flyway.

Biologists at the Division of Fish and Game have worked hand in hand with soil conservation districts in developing 30 sites, of anywhere from an acre to 200 acres, where the "Wildlife Only" sign hangs out. SCS technicians working with the district have helped by staking out areas best suited for wildlife development, stabilizing water levels with low impoundments, planting food and cover strips, and making erosion-control plantings on embankments and dikes.

One of the most outstanding wildlife developments is Carolina Pond in Richmond (see cover photograph, March 1962, SOIL CONSERVATION). The day this 4-acre pond was opened to the public, 250 trout fishermen showed up; and it has continued to relieve fishing pressures on other waters in southern Rhode Island. Meanwhile, Arthur Tetreault and Russell Jarvis of Glocester in the Northern Rhode Island district turned to their district for planning help and use of its bulldozer in building a series of ponds for raising frogs for market. It was important that the pools be built right, the water levels properly controlled, and water of such quality be provided that the frogs, themselves a resources product, would thrive profitably.

Woodland, covering more than half the State, though estimated in the needs inventory to decrease by only $1\frac{1}{2}$ percent, or from 423,389 acres to 417,074 acres, has problems in tree planting and other woods management, as a result of cutting and re-cutting of timber for pulpwood and for manufactured products.

The University of Rhode Island and the Rhode Island Division of Harbors and Rivers are cooperating in the soil conservation program by helping, among other ways, to introduce and gear special plant materials to solve such hard-to-crack soil and water problems as the State's long-standing troubles with shore erosion.



Race horses on Fair Oaks Farm.

Sampling soil on a problem drainage area in Marshall Village, Middletown, in Eastern Rhode Island SCD.

Youth's needs also are being taken into account in Rhode Island's current and projected conservation activities. Yawgoog Boy Scout Camp, the largest boys' camp in New England, has an intensive achievement program in soil and water techniques for 5,000 youngsters each summer. The natural resources conservation program also is reflected in the activities of numerous other boys' and girls' camps.

Among them is the development of 728 acres along conservation lines on the north end of Prudence Island. Here an impressive layout of wildlife preserves, marshes and ponds, and improved grassland is contemplated as an ideal setting for the recreation and outdoor training of youth groups. Development of the project, the dream of Dr. Mathew A. Rossi of Cranston, is being helped by the Eastern Rhode Island Soil Conservation District at Newport.

These diverse developments in land and water use, with many others that are to come, project the face of Rhode Island of tomorrow. Continuing soil and water conservation "face lifting" by the State's land users is the best assurance to all people of Rhode Island that it will be one that is satisfying to look upon and with which to live.

ACP Aims At Co

By

Carl Larson

THE National Conservation Needs Inventory has in effect set up millions of targets for conservationists.

Practices, like bullets, should go to the bull's-eye, and we in the Agricultural Conservation Program are sharpening our sights. We do not want to waste our powder with a blunderbuss attack. We therefore hope that each soil conservation district board, each conservation minded farmer, and each agricultural worker (Soil Conservation Service technician, county agent, vo-ag teacher, Farmers Home Administration supervisor, forester, wildlife specialist, and the rest) will help make efficient use of ACP resources in meeting locally pinpointed conservation needs.

Large financial resources will be required if farmers and ranchers are to apply, within a reasonable time, the conservation practices for which needs are shown by the inventory. The Department's Land and Water Resource Policy Committee in its preliminary report stated that to apply the needed conservation practices within 20 years, would cost $2.5 billion a year—10 percent of current farm operating costs. The current rate of application is about one-third of that needed. The ACP now shares costs on about two-thirds of the amount being done.

Conservationists in each community have a handy new weapon to use in drawing a bead on targets for cost-sharing. It is the modernized memorandum of understanding between the Department of Agriculture and soil conservation districts.

Agricultural Stabilization and Conservation Committees throughout the country are being supplied with Secretary Orville L. Freeman's Memorandum No. 1488, and thus alerted to the fact that modernized memorandums are being offered to existing districts as well as to new districts. The committees are being encouraged to provide district governing bodies with all pertinent information that is on file and helpful in a review and modernization of the district's conservation program.

This is a good occasion for the committees and SCD governing bodies to reexamine the arrangements in effect for bringing ACP to bear on the districts' conservation programs and on individual farm conservation plans. Memorandum 1488 continues the provision for each agency to make its assistance available to the district through either a supplemental memorandum or other appropriate arrangements. The ACP arrangement as stated in our National Bulletin provides for the district governing body's participation in formulation of the county ACP and use of cost-sharing funds for SCS technical services to assure that approved standards are met. ASC Committees also make available to district governing bodies each year information on the kind and extent of soil, water, woodland, and wildlife conservation practices on which costs were shared.

This annual procedure of planning the program and reporting results offers an opportunity to correlate cost-sharing with technical assistance, credit, education, and other services so as to achieve maximum results. However, the occasion of entering into modern-

Many Utah conservation farmers line their irrigation ditches with concrete to prevent water-seepage losses.

Note:—The author is deputy administrator, conservation, Agricultural Stabilization and Conservation Service.

ervation Needs Targets

rson

ized memorandums of understanding is a good time to do an especially thorough job.

In this process, I am sure it will be recognized that practices alone will not assure conservation. Getting needed land-use adjustments is one of the major conservation problems of our time. While the inventory indicates that important changes, such as urbanization and shifts in cropping patterns, are and will be taking place, the economic facts recently highlighted by President Kennedy and Secretary Freeman, indicate that the changes need to be accelerated:

1. Much less cropland than we have available is likely to be needed for crop production for some years;

2. We have tremendous unmet and growing needs for recreation land.

Both the economic picture and the conservation needs inventory point to the fact that much cropland should be shifted to less intensive uses. ACP has shown itself to be a useful instrument in encouraging shifts in line with national needs. Additional program measures now under study include long-term arrangements with individual farmers, recreation developments, and new rural areas development projects. Whether these are adopted or not, there can be no doubt of the need for rapid land-use shifts based on sound knowledge of soils, good soil and water management, and economic requirements. Thus we see in new light the need for close communication between ASC Committees, district governing bodies, and all agencies that contribute to conservation.

Land-use shifts and conservation practices that fit in with rural area development plans are being discussed with farmers in thousands of communities. Committeemen hope that ACP cost-sharing will help at least 100,000 farmers start conservation activities this year, in addition to helping more than a million farmers speed up conservation work already under way. Cost-sharing thus is serving as a catalyst in setting off the desired chain reaction to convert education, technical assistance, and credit into conservation achievements.

Experience indicates that ACP is important to individual farmers and ranchers in carrying out their part in watershed projects such as those under the Watershed Protection and Flood Prevention Act. For example, in my home State of Utah, work has been speeded up in the American Fork-Dry Creek Watershed Project with the help of \$20,000 a year of additional ACP funds channeled to the watershed by the ASC State Committee and by concentration of regular ACP funds on watershed land-treatment work. To make best use of the increased cost-sharing, the Alpine Soil Conservation District bought ditch-lining equipment, and the SCS increased its technical assistance. In 3 years, farmers have been able to install 187,000 feet of ditch lining, a long step toward their original 10-year goal of 300,000 feet.

The conservation needs inventory indicates the tremendous extent of conservation problems which need to be corrected. For example, 1 of each 2 acres of cropland is shown as having an unmet erosion problem. One in 5 acres has an excess water problem.

The need for establishment of adequate vegetative cover was found on 1 of each 7 acres of pasture and range, and the cover needs improvement on 1 of each 5 acres.

There is also the need for establishment of a stand of trees on 1 of each 5 acres of farm and commercial forest land, and stand improvement on 2 of each 5 acres. All of these are practices on which ACP provides assistance.

The time is short. Foresight, knowledge, skills, and funds must be carefully used if our soil, water, woodland, and wildlife resources are to be developed, conserved, and used to meet the needs of our people.

Three-year-old pines, protected from fire and grazing, on H. C. Burke farm in Pike County, Ark., in Little Missouri SCD.

California Farmers Have System For Meeting Conservation Needs

By Austin D. Warnken

FARMERS and ranchers cooperating with 27 soil conservation districts in 10 counties in the heart of California's productive Sacramento agricultural area recommend the system they have perfected for keeping up with soil and water conservation needs on the districts' 2½ million acres. The counties are Colusa, Sutter, Yuba, Yolo, Solano, Sacramento, San Joaquin, Contra Costa, Alameda, and Stanislaus.

For example, these farmers—3,700 of them—spent $4.5 million in private capital for conservation work during the 1961 fiscal year. That was an increase of $2 million, or 80 percent, during the last 4 years, and nearly double the $2.5 million of their own money they invested in conservation in fiscal year 1958. The Soil Conservation Service gave them technical assistance, but Federal funds amounted to less than 10 cents for each dollar spent by the farmers.

Some 600 of the districts' cooperators also participated in Agricultural Conservation Program cost-sharing on approximately a fifty-fifty basis.

Watershed protection construction contracts for flood prevention amounted to another $1¼ million in 1961, of which $600,000 were Federal funds and a substantially greater $650,000 was local outlay.

It all adds up to $5¾ million of conservation work with more than 75 percent of the cost coming directly from private or other local sources.

Note:—The author is area conservationist, Soil Conservation Service, Sacramento, Calif.

The number of farmers cooperating with the 27 soil conservation districts jumped from 2,200 on June 30, 1958, to about 4,000 today. From fewer than 300 a year in 1958, new district cooperators had increased to 750 in 1961, or by 2½ times.

The past 3 dry years have stimulated conservation work, especially water-conservation measures

Constructing checks for border irrigation in California.

such as land leveling, that increased from 7,300 acres in 1958 to an annual rate of 21,000 acres in 1961. Farm and ranch pond construction also is up; and pasture planting likewise has come in for its share of increase, with about 5,600 acres going into pastures in 1961, as compared to 1,400 acres in 1958. Waterlogged irrigated land also is being drained, with about 70 miles of open drain ditches built by these same farmers on their ranches during 1961.

The district cooperators meanwhile are working out more and more conservation farm and ranch plans, with the help of SCS technicians. They prepared 492 plans in fiscal year 1961, or nearly 3 times as many as the 173 they developed in 1958.

The size of the farm and watershed conservation job yet to be done in California is indicated by findings for the State in the National Inventory of Soil and Water Conservation Needs. The inventory shows, for example, that conservation treatment is still needed on more than 6¾ million acres of cropland and on more than 9 million acres of pasture and range land, and that about 3 million acres of woodland needs planting and close to 4 million acres needs timber stand improvement.

Also indicated is the need for 195 irrigation development projects by 1975, involving nearly 3 million acres. A total of 1,215 small watersheds were delineated in the California inventory, of which 1,000, consisting of 61 million acres, are needed for development of watershed protection and flood prevention-type projects.

The inventory likewise confirmed the continuing trend of agricultural land's being shifted to nonagricultural uses, with 1,870,000 acres estimated to go out of agriculture by 1975 and 814,000 acres to come into private agricultural use from public domain or other sources, for a net decline in agricultural land use of somewhat more than 1 million acres.

GREAT PLAINS Pinpoints Conservation Needs

By Cyril Luker

PERHAPS the most critical area of the United States from the standpoint of soil and water conservation needs is made up of the 10 Great Plains States. Locale of the never-to-be-forgotten "dust bowl" of the 1930's, this breadbasket of America stimulated, more than any other part of the country, the start of today's national action conservation program.

That its problems have not yet been solved completely is attested to by the fact that Congress has appropriated $10 million a year for conversion of hazardous croplands to grass and other land- and water-conserving measures, through the special Great Plains Conservation Program running until 1971. The National Inventory of Soil and Water Conservation Needs has brought more sharply into focus what has to be done in this vast and fertile agricultural area to assure its stability and permanence in the Nation's economy.

Nearly one-third of the 422-county area eligible to participate in this program consists of cropland. In the 48 mainland States together, 5.6 percent of the present cropland acreage is on soils not really suited for cultivation. But the comparable percentage for this 422-county area is 9.6 or nearly twice as much.

The conservation needs inventory disclosed these facts about the 366 counties so far participating in the Great Plains Conservation Program—an area consisting of more than ⅓ billion acres of land and more than 1 million acres of water:

Note:—The author is assistant to the Administrator, in charge of the Great Plains Conservation Program, Soil Conservation Service, Washington, D. C.

There is expected to be a substantial reduction in the acreage still used for crop production by 1975; while the pasture and range acreages will increase, and forest and woodland will decrease slightly. Meantime, nearly half a million acres is expected to go from agriculture into urban, highway, recreational, and other uses.

The inventory shows conservation treatment to be needed on more than 62 million acres of the 366-county area's cropland, to deal with overlapping problems of soil erosion, excess water, and soil deficiencies. It similarly points to the need for conservation treatment on 133½ million acres of the pasture and range land in these counties; and, on forest and woodland, for 1⅓ million acres of woodland protection and nearly ⅓ million acres of planting or reestablishment of trees.

The Great Plains Conservation Program, complementing the programs of farmers' and ranchers' soil conservation districts and the Agricultural Conservation Program, is making gratifying progress in meeting this critical area's soil and water conservation problems. It also is setting a pattern for potential use in other parts of the country having common regional problems.

To February 1 this year, for example, 8,000 contracts had been entered into by farmers or ranchers, providing long-term cost-sharing and technical aid on 20 million acres. Conservation accomplishments up to the beginning of the present fiscal year on July 1, 1961, had included 608,000 acres of croplands converted to grass and 563,000 acres of pasture and range land reseeded. These are two of the principal measures carried out through the program.

Windbreaks like this one on Earl Burress' farm near Gordon, Nebr., are among conservation measures needed in the Great Plains.

Conservation Needs Figures

Welcomed in Carolinas

By Sellers G. Archer

NORTH and South Carolina's agricultural and educational interests were prompt to draw upon information gathered in the National Inventory of Soil and Water Conservation Needs to advance their States' conservation programs. Everybody from soil conservation district supervisors in the two States to the Governor of one has welcomed the inventory data as information needed for immediate and practical use.

The first copy of the inventory for South Carolina was presented to Governor Ernest F. Hollings by the chairman of the State Soil Conservation Committee, A. B. Carwile. Carwile and other members of the committee explained to the Governor how the inventory will be an invaluable source of basic information on the soil and water resources of the State, and how it will be used widely by soil conservation districts and chambers of commerce, schools, industrial concerns interested in agricultural production, and by all agricultural agencies of the State.

"This is a significant achievement of much importance to South Carolina," Governor Hollings commented. "I hope it will receive much use in the future."

The Governor was so intrigued by a layout of soil conservation pictures arranged in the shape of the State which appears on the cover of the report that he asked for an enlarged photograph of the cover for his office.

Gov. Hollings discusses conservation needs inventory with (l. to r. seated): W. E. Dargan, E. M. Caughman, the Governor, Dr. J. B. Douthit, A. B. Carwile, pres. S. C. needs committee, and W. B. Bookhart; (Standing): Committee V. P. Guy V. Whetstone, R. M. McGregor, SCS State Conservationist T. S. Buie, L. E. Hendricks, and A. T. Chalk.

Newly developed contour parallel terraces on C. I. Pope farm operated by Lloyd Wiggs in North Carolina's Coastal Plain SCD.

Soil and water conservation districts in both Carolinas have used the needs inventory information in revising their programs and work plans. Fourteen of North Carolina's 50 districts had used this information by March 1 this year in bringing their programs up to date. They are the Alamance, Caldwell, Franklin, Hoke, Person, Robeson, Scotland, Alleghany, Caswell, Granville, Nash, Southeastern, Rockingham, and Stokes districts.

In South Carolina three soil conservation districts already had revised their program and work plan documents on the basis of the new and dependable needs information, and other districts are in the process of doing so. The three are the Orangeburg, Horry, and Union County districts. Conservation needs inventory information is given in broad terms of treatment practices.

South Carolina's experience also illustrates the broader distribution and use of needs inventory information. Three thousand copies of the 56-page South Carolina inventory were printed, with the cost underwritten by the State Soil Conservation Committee, which also is handling their distribution. Purchasers of the inventory include

Note:—The author is field information specialist, Soil Conservation Service, Spartanburg, S. C.

the Forest Service, the vo-ag section of the State Department of Education, Farmers Home Administration, the State Department of Agriculture, the Clemson Agricultural College Extension Service and Experiment Station, the Farm Credit Bank, the State Development Board, the Richland County Agricultural Stabilization Committee Office, the State Commission of Forestry, and the State Seedsmen's Association.

In addition, single copies of the inventory have been distributed widely throughout the State by the committee. Dr. G. R. Graham, head of the department of geology, mineralogy, and geography, University of South Carolina, has distributed copies to the two college libraries, the economics department, the department of geology and geography, and elsewhere.

"This is a fine publication," Dr. Graham stated, "and I would like to see it made available to students and faculty alike."

There also was considerable use made of the information in the North Carolina inventory, even before the State report was available. For example, the North Carolina Agricultural Experiment Station has made use of the expected land uses and adjustments in planning long-range research activities. Specialists of the North Carolina Agricultural Extension Service are using the information with county groups.

◆

Drifting sand threatens to obliterate parts of Route 6 northeasterly to the outer coast-line of Cape Cod. More than 10,000 yards of sand deposited by surface wind has to be removed annually from the highway. John M. Zak of the University of Masssachusetts plans to stimulate existing vegetation by fertilization, to plant beachgrass in critical areas to stop the movement of sand, and to use other remedies.

A CITY LOOKS TO THE SOIL

By Harold E. Grogger

OFFICIALS of rapidly growing Springfield in the western edge of Missouri's Ozark Mountains are planning ahead on the basis that their city's future depends upon how the land is used in the 40-county area around it.

The planning staff of this southwestern Missouri city of nearly 100,000 population, under the leadership of City Manager Tom Chenoweth and Director of Planning Shawnee Stewart, aided by Harold Haas, is working on a comprehensive general plan for Springfield. It takes heavily into account soil survey and soil and water conservation needs inventory information developed for the Springfield area. For the State as a whole, the inventory shows approximately 465,000 acres expected to shift from agriculture to urban or other nonagricultural uses by 1975.

Because the city planning commission considers the soils of this 26,326 square-mile area to be its basic resources, it asked the Soil Conservation Service for help in evaluating the soils. Service technicians were prepared to oblige, as they had the local soil survey information and the Missouri part of the National Inventory of Soil and Water Conservation Needs at their fingertips.

Technicians of the surrounding area in Missouri, Arkansas, Oklahoma, and Kansas assembled data showing a range from deep, level, well-drained Class I soils to shallow, stony, steeply sloping soils suited primarily only for growing grass or trees.

The soil inventory revealed that Springfield, like many other cities, occupies some of the area's best land suitable for crop production. The nearly level to gently rolling plain upon which it was built is one of the broadest areas of fertile soils in the State.

Less than 20 years ago, Southeast Springfield, where a large shopping center and subdivision now stand, boasted only an occasional

Note:—The author is State soil scientist, Soil Conservation Service, Columbia, Mo.

Scores of cars on concrete parking lot covering what was farmland a few years ago.

Three or four years ago this Springfield residential area was being farmed.

house among the area's fields of corn, hay, and pasture. This area that was good for farming also was good for city expansion!

Realtors, city engineers, and homeowners also are asking for more soil survey information. They recognize that giving attention to the soil may be even more important in urban than in farming areas, because of the value of localities. The price of a single city lot may far exceed that of a whole farm field. An understanding of the soil is important to builders and contractors, homeowners, and utilities and other municipal interests. Foundation design, drainage, sewage disposal, street and other construction, and installation of utility systems all are affected by the kind of soil involved.

Members of Springfield's city planning staff, in their inventory of the 40-county area, were interested in far more than the layout of the city, however. They were looking forward to what makes a city grow. They recognized that the productive capacity of the land around it is a midwestern city's most important resource.

Farms and their production are the backbone of Springfield and sister cities up and down the country. Beef cattle or soybeans, dairy cattle or corn eventually reach the city, either directly or indirectly. Oats, barley, wheat, chickens, turkeys, timber, quail, rabbits, bass or bluegill—all are products of the soil and water, and have an all-important impact upon these towns and cities. Machinery and equipment to produce these crops, as well as food, housing, clothing, transportation, and recreation all are part of the chain reaction of rural-urban relationships set off by the land's production.

Recognizing this interrelationship, the Springfield's Planning Commission studied the 21 different soil groups in the 40 counties of their 4-State area, and considered their suitability for cropping, pasture, timber, or wildlife use. In determining Springfield's probable future needs, it inventoried kinds of land use—for cash grain, dairy, livestock, or poultry production, or as tree farms or recreational areas. It also took into account the numbers and the economic and other interests of the people of the region, the size and location of smaller towns, and the adequacy of transportation.

The City Planning Commission even considered the kinds of crops likely to be grown on the land, along with fertilizer, insecticide, and farm equipment fuel needs.

The Planning Commission went further, in reviewing operations in nearby soil conservation districts to determine soil and water conservation needs. Also studied were needs for equipment, seed, buildings, storage, home improvement, appliances, livestock and livestock sales, and the dozens of other activities and needs on the farm that are so closely meshed with a city's future.

Information obtained from the National Inventory of Soil and Water Conservation Needs, supplemented by information on climate, transportation, communications, finances, and human resources, has provided the basis of a master plan for Springfield.

City officials are counting upon the comprehensive plan to guide them right. The studies to determine the boundaries of the Springfield area, and of the physical resources and capabilities of the area's soil, give the plan a firm base that avoids trial and error planning confined to the city limits.

◆

If you have your eye on a plot of land you think would make a good homesite, winter or spring is a good time to find out how good it really is. For that is the time when most problems in water disposal show up, Samuel W. Bone, Ohio State University Extension agronomist, points out. Wet spots you see during this season are signs of poor drainage—and poor drainage on a homesite can lead to muddy yards and wet basements.

If you're looking at a lot outside a municipal area, with only electricity and gas available, getting an adequate supply of safe drinking water and a satisfactory sewage disposal system may present problems. Soil Conservation Service soil surveys are the most dependable sources of information bearing upon such problems.

Michigan Counties Use Soil Surveys To Measure Conservation Needs

By Glenn Bedell

INCREASINGLY complex rurban and rural area developments point up some of Michigan's more urgent land-use and water-management problems.

Information brought out in the National Inventory of Soil and Water Conservation Needs as to where this State is headed with respect to its land and water resources includes the fact that loss of cropland to industrial and residential expansion by 1975 will more than offset the increase of agricultural land through drainage and clearing, and that significant shifts to agricultural use will be required to meet the increased demand for farm products. Though food supplies will be abundant, because of technological advances in production, careful planning will be needed to promote orderly changes of land to more desirable uses, whether for cultivated cropping, growing pasture and hay or tree crops, or for wildlife or recreational use. The facts developed by the Michigan needs committee will be published by Michigan State University.

Meanwhile, better to meet these mounting problems, urban and rural planning and other authorities in several Michigan counties have been making growing demands upon the Soil Conservation Service and the University's soil science department for their cooperatively developed soil survey information, which also was basic to the conservation needs calculations. Michigan is one of the leaders in the use of soil surveys for rurban land development, particularly in the southeastern part of the State. With their help, they are already beginning to avoid serious mistakes before they happen.

This was a prosperous farm not so long ago.

In Macomb County, for example, a $135,000 soil survey was proposed, to get badly needed information for both urban and rural dwellers. This includes information on flood plains where building construction might expand; availability of private water supplies; best location for sanitary land fills, and size and location for septic tank tile fields; how to appraise the value of rural properties developing into urban areas and get fairer rural land assessments; and the best way to plan sublevel construction, roads, and drains.

The county has offered to pay for the soil surveyors' services, or approximately $30,000 a year for 3 years, with the rest of the expense of surveying the county borne by Federal and State agencies. The Macomb County Planning Commission, the county sanitary engineer, and other forward-looking officials have put special emphasis on soil studies the last few years as basic to land-use planning in the county.

Similar steps have been taken elsewhere in the State. Thus a soil map was prepared for the Lansing Tri-County Regional Planning Commission to meet particular needs. Taken with other studies, it will provide the basis for recommendations for desirable future development of Ingham, Eaton, and Clinton counties.

Calhoun County's 1916 soil survey maps were updated by the SCS and are used by the county Extension and sanitation people in com-

Note:—The author is soil scientist, Soil Conservation Service, Jackson, Mich.

munity planning, and to develop physical land standards for troublesome waste disposal, drainage, and water supply in the Battle Creek and other areas.

Analysis of the land surface has been particularly valuable in the metropolitan area of Jackson County. Much of the county's hilly sand land and low-lying, wet, sandy lands are of questionable agricultural use; but they are suitable for residential use and for developing parks, open spaces, nature and recreational areas. That is, with adequate sewage, street, and water facilities resulting from careful planning, and acceptance by developers.

Rapidly expanding Ann Arbor and Ypsilanti posed severe sewage disposal and other rurbanization problems on soils excellent for farming in Washtenaw County. To meet the immediate needs of sanitation engineers and the Washtenaw Planning Commission, the SCS developed a revised soil map, using the old 1930 published soil survey, soil conservation survey maps made subsequently for Washtenaw Soil Conservation District cooperators, and aerial photographs.

Use of the general soil maps by townships in Washtenaw County prompted the planning director to request soil maps of Milan and London townships in Monroe County. These maps were made in 1961.

A soil management group map also was completed for Livingston County, by updating its 1930 soil survey map, to serve needs until a modern standard soil survey map is completed. It also will be used to provide soil information for an orderly expansion of urban use of land in Livingston County, thereby avoiding possible costly mistakes by developers and others.

Lake pollution problems resulting from waste disposal in Hillsdale and Branch counties have prompted health officials and planning commissions to request soil maps for lands around their lakes, which are much in demand for properties with lake frontage. Requests for soil maps are pending for land around other lakes. Careful use of soil survey maps will help local people and officials keep the lakes clean and wholesome. More people are learning how to use soil maps. They are being used both to attract people to desirable places to live and to direct attention to the importance of maintaining good agricultural land in that, its best, use.

Macomb County officials examine soil profiles. (L. to r. back row): County Road Engineer George Klein, Agricultural Extension Director Jack Prescott, and County Sanitary Engineer Merline Damon; (front row): District Drain Engineer Robert Purnell and County Planning Director Bill G. Rowden.

A problem common to Michigan and surrounding States—new houses built on low-lying areas with drainage problems.

National Needs Report

The great volume of statistical data about the Nation's agricultural land resources and their conservation needs, resulting from the Soil and Water Conservation Needs Inventory in each county and State, are being combined into a national summary now in preparation for publication.

The major findings are being presented first in a graphic digest entitled "Agricultural Land Resources." This is a 32-page album-style booklet consisting mainly of graphic representation of the data.

A narrative summary and complete statistical tables, including basic data from every State summarized by 10 economic regions and nationally, are being prepared for publication.

◆

A world food study by USDA finds that, for the first time in history one-third of the world's population is free from the fear of hunger.

Watershed Research for the Northeast Points Up Water Conservation Needs

By Martin L. Johnson

A major problem in comprehensive resource planning for the future is the prediction of quality and availability of water.

Its importance in the four Northeastern States of Vermont, New York, New Hampshire, and Maine, parts of which are included in special new watershed research, was pointed up in findings of the Soil and Water Conservation Needs Inventory. A total of 475 small watersheds were delineated in the inventory. On 188 of them, involving nearly 25 million acres, watershed protection and flood prevention projects were determined to be needed.

Water often exists simultaneously in many forms within a watershed—as snow on the mountains, ice on the lakes, liquid in the streams, and vapor in the air overhead. The snow and ice may melt, or the streams may freeze; water vapor may coalesce and fall as rain, or be increased by water evaporated from lakes, streams, vegetation, and even snow. These changes occur as water responds to changes in the weather and the amount of available heat energy from the sun. When it comes as rain or from melting snow, water flows downhill to the streams or percolates into the soil to the water table, from which it issues as springs and seeps, and so continues on its way to the ocean.

Collecting data from continuously recording precipitation gage.

Add to these actions the effects that soils, vegetation, bedrock structure, topography, and other features of the land have on the distribution of water in Nature, and the complexity of the watershed becomes more apparent. Ploughing and other cropping practices, woodland and pasture treatment, urban and other paving, and drainage all add to the difficulty of predicting the watershed's behavior.

Civilization's complicated and expanding demands for pure water in quantity delivered to the proper place imposes a need for the prevention of floods, drainage of wet lands, and increased water storage for recreation, wildlife, irrigation, and power. All of these demands, and more, must be considered in a national effort to provide optimum plans for the greatest beneficial use of our water resource.

Our technology is faced with the task of developing and applying the new knowledge through comprehensive watershed research that will enable us to understand the complex interrelationships of land, water, and climate. The Soil and Water Conservation Research Division of the Agricultural Research

Weir and footbridge on 17-sq.-mi. watershed. Flow is about 15 cu. ft. per second.

Service of the U. S. Department of Agriculture has been authorized by Congress to expand its comprehensive watershed-research program in order to assist in meeting the Nation's growing needs for such information.

One of the new research watersheds, the Sleepers River Basin at Danville, Vt., is in a typical northeastern dairy region. All of the research work in the basin is cooperative with the Vermont Agricultural Experiment Station, the University of Vermont College of Technology, Vermont Water Conservation Board, and the Soil Conservation Service. This location was chosen as representative of the glaciated upland area of the Northeast, where intensive dairy farming, industry, and large population centers combine to create an unique water-resource problem.

Immediately after the research watershed was selected, plans were

Note:—The author is hydraulic engineer, Soil and Water Conservation Research Division, Agricultural Research Service, Danville, Vt.

Device in background is used for study of hydraulics of steep mountain streams.

begun for an intensive weather station network and a system of stream-gaging stations. Installing the correct number of instruments at the proper locations within the watershed was a major undertaking. There had to be enough precipitation gages, thermometers, evaporation stations, snow courses, and other facilities to provide the research engineer with an accurate picture of the weather patterns within the watershed and its immediate vicinity. The weather stations had to be located carefully, so that the data would reflect important variations in the local weather pattern because of topographical causes, and would provide a uniform coverage of the area.

Each of the 29 weather stations, to illustrate, has a continuously recording precipitation gage and an air thermometer which registers daily high and low temperatures. At 14 selected stations, snow measurements are taken once a week throughout the winter. The snow depth, the amount of water in the snow, and the snow density are computed for each station and for the entire basin. At 5 of the stations, there are evaporation pans, anemometers, hygrothermographs, and plots for measuring soil temperature and moisture. One or 2 stations also have wind speed and direction recorders, sunshine duration recorders, distance thermographs, and a microbarograph.

The 43-square-mile Sleepers River Basin has been instrumented to measure overflow from 11 subwatersheds. In 9 of them, reinforced concrete weirs accurately measure the runoff. Adjacent to each weir is a continuously recording depth meter. Together, they provide an accurate picture of the behavior of the stream and its response to snowmelt, rainfall, and drought.

A watershed reacts to the continuously varying weather—to sunshine, wind, rainfall, and other atmospheric phenomena. How it reacts, and to what extent, is determined by its physical characteristics, such as land use, soil texture, slopes, underlying rock, and the type and amount of plant cover.

Understanding these interrelationships is an important goal of watershed engineers. The data needed for such studies within the Sleepers River Basin are being assembled. Much of the information, such as that on area, shape, topography, and others, is available from existing topographic maps. The soils have been mapped and classified by the Soil Conservation Service. The bedrock geology has been determined by the Vermont Geological Survey. The stream classification, bifurcation ratios, and other factors of similar nature await completion of detailed surveys.

All of this construction, instrumentation, mapping, and data-gathering is designed to furnish the information needed to carry forward eight ARS experiments on different phases of watershed hydrology. They are designed to meet the research needs of agencies concerned with water-resource control and development, and are subject to constant review.

The Soil Conservation Service, for example, utilizes these research findings in the design of flood-detention dams and other control structures for the rapidly expanding small-watershed protection and flood prevention program for which it has primary responsibility in cooperation with the States and local organizations. The Service draws upon ARS findings to modify and improve the specifications for smaller conservation structures.

Thus it is that conservation research and technical action team up to get the job ahead done.

No. 67

This is the sixty-seventh of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

Luther Clark's tobacco in North Carolina, grown on 2-year-old fescue in 4-year rotation, produced 2,335 lbs. an acre in 1960 and soil was protected.

Yields Vary With Soils

Crop yields vary considerably with the soils in which the crops are grown. In a 5-year experiment at Virginia Polytechnic Institute, a hybrid corn crop was treated exactly alike on several different soil types. Woodstown loamy fine sand, for example, gave an average yield of 99.1 bushels, while Cecil sandy clay loam gave only 72.5, a difference of 26.6 bushels.

Conservation Needs Information

Speeds River Basin Planning

By **Frank R. Brower**

PLANNING for agricultural land and water resource development in eight major river basins in the Southeast was speeded up materially because of the availability of information obtained in the National Inventory of Soil and Water Conservation Needs for the five States involved.

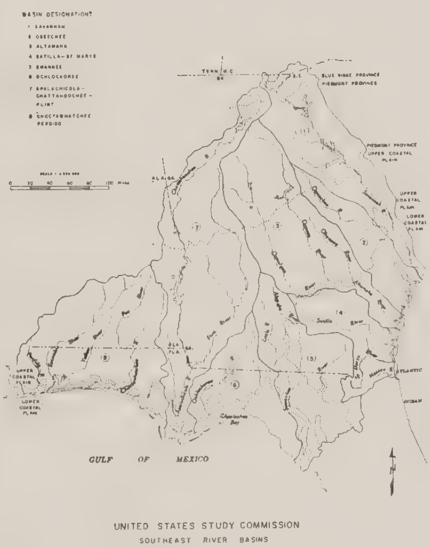
The basins include parts of Alabama, Georgia, Florida, and South Carolina, and a small part of North Carolina. The study, upon which future land and water resource development in these areas is expected to be based, covers 86,500 square miles. It is being made by the U. S. Study Commission authorized by Congress in 1958 to prepare comprehensive integrated plans for such development in the Southeast river basins, with a representative from each of the four States principally concerned and one from each Federal department concerned.

The Soil Conservation Service is conducting investigations to provide information to the study commission with respect to the agricultural aspects of land and water resource development. The Service's 9-man survey party used the conservation needs information in developing the trends of land-use patterns for each river basin area, projected to the year 2000 with adjustments for expected changes in technology, population, and other factors. Soils and land-capacity data and irrigation and drainage needs from the inventory were drawn upon to estimate crop yields under varying treatment and management.

Use of the conservation needs data made possible the completion of 40 technical memorandums in record time. Importantly, also, it provided the basin survey technicians with comprehensive information based on the combined knowledge, opinions, experience, and judgment of local agricultural leaders in the counties.

Land-treatment measures, costs, technical assistance needs, and other information were estimated for each river basin.

The watershed project needs portion of the inventory also was projected to the year 2000 for purposes of the study commission. This information was supplemented by a study of 20 watershed



work plans and 12 additional watershed planning units included in the inventory, all selected as representative of the basins' varying physiographic, topographic, and problem conditions. Land-treatment and structural measures needs, costs, and benefits were expanded for each basin, and likewise projected to the year 2000.

Locally developed information for areas having floodwater and sediment damage, needs for irrigation, drainage and reclamation, and nonagricultural water problems served as the basis for estimates of the needs for watershed projects, the number of farms involved, and project costs and benefits.

Conservation-protected land like Jack Wright's Tift County farm in the Middle South Georgia SCD is one of end products expected of surveys in this and other river basins.

Note:—The author is Southeast River Basin Survey party leader, Soil Conservation Service, Athens, Ga.

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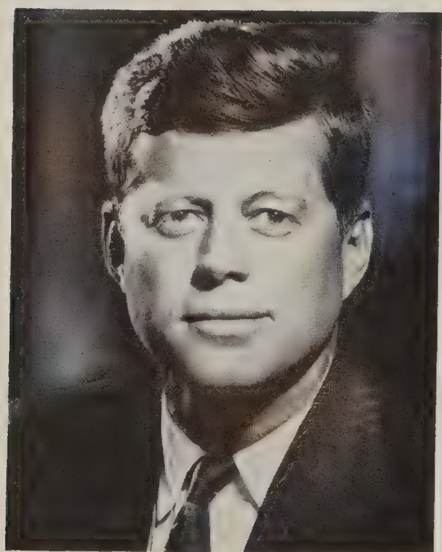

President John F. Kennedy.

"As our population expands, as our industrial output increases, and as rising productivity makes possible increased enjoyment of leisure time, the obligation to make the most efficient and beneficial use of our natural resources becomes correspondingly greater. The standard of living we enjoy—greater than any other nation in history—is attributable in large measure to the wide variety and rich abundance of this country's physical resources. But these resources are not inexhaustible—nor do they automatically replenish themselves.

"We depend on our natural resources to sustain us—but in turn their continued availability must depend on our using them prudently, improving them wisely, and where possible, restoring them promptly. We must reaffirm our dedication to the sound practices of conservation which can be defined as the wise use of our natural environment; it is, in the final analysis, the highest form of national thrift—the prevention of waste and dispoilment while preserving, improving, and renewing the quality and usefulness of all our resources. Our deep spiritual confidence that this Nation will survive the perils of today—which may well be with us for decades to come—compels us to invest in our Nation's future, to consider and meet our obligations to our children and the numberless generations that will follow.

"Our national conservation effort must include the complete spectrum of resources: Air, water, and land; fuels, energy, and minerals; soils, forests, and forage; fish and wildlife. Together they make up the world of nature which surrounds us—a vital part of the American heritage . . .

"For a quarter of a century, we have recognized that a major responsibility for resources conservation rests with the farmers, ranchers, and others who own three-fourths of the Nation's land area. Today 2,900 soil conservation districts provide leadership in the conservation effort with Federal technical and financial assistance. . . .

"Much progress has been made—by land terracing, stripcropping, and other erosion prevention and water conservation measures—but nearly three-fourths of private crop and range lands still need improved conservation practices. Joint action to conserve this basic resource—the land—must be continued and intensified for the benefit of future generations."

—Excerpts from the President's message to Congress on Conservation, February 28, 1962.

1 New Baby— 422 New Trees

For every baby born in the United States—one about every 7½ seconds—at least 422 tree seedlings are planted as extra assurance of enough lumber and other forest products for future needs for the Nation.

Seedling planting has increased more than 330 percent in the last decade, while the annual number of births has increased less than 20 percent. Nearly 9 out of 10 trees are planted on privately owned lands.

—National Lumber Manufacturers Association

JUNE 1962

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

Soil Conservation
25 Years Ago

"A little more than 20 years ago there were some fine stands of bunch-grass on the Colville Indian Reservation in Washington. Indian grazing in those areas had not been severe, so that the grass remained almost in its virgin state, while outside the reservation it already had been grazed down to the roots. . . .

"The Hayden surveying expedition of 1870 found this same rich stand of grass in Utah and Wyoming, a vivid contrast to present conditions in areas where weeds, annual grasses, and other growths of less forage value have replaced it in some places, and sagebrush . . . has become the dominant plant in others. . . .

"The immediate heritage will be bare soil, rough land, and a mere subsistence or starvation condition unless the balance soon is restored in some measure. Restoration of this balance is the aim of the Soil Conservation Service."

COVER PICTURE—The old and the new! Old rail fences and outbuilding on the Lyda E. Martin farm in Harrison County, W. Va., harmonize with the contour stripcropping and tree and wildlife plantings included in the complete soil conservation system.

VOL. XXVII, NO. 11 JUNE 1962

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Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

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FRANK B. HARPER, Editor

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Soil and Water Problems Concern for Two Centuries

By Donald A. Williams

THE face of the land has changed greatly all across the United States in the last hundred years. Changes wrought by man's axes, plows, and herds had their beginnings much earlier in the eastern and southern Colonial regions; and men like George Washington and Thomas Jefferson sought, with little success, to encourage cropping and tillage practices that would protect the land from erosion.

It took a hundred years or more for us to heed, through any general concerted action, the warnings of those Colonial statesmen and agriculturalists. Men still living, or their fathers, had a hand in the clearing and plowing and grazing that so often upset Nature's land and water balance, from mountain slope to flood plain. Theodore Roosevelt, Gifford Pinchot, and Hugh Bennett were the leaders in a 20th Century renaissance of forest, soil, water, and other resource conservation.

It was just 100 years ago, May 15, 1862, that President Abraham Lincoln signed an act creating the U.S. Department of Agriculture, which is celebrating its centennial throughout the rest of 1962. That marked the start of a continuing national effort for improvement and fuller use of our productive agricultural resources.

It has been followed during the 10 succeeding decades by many other Congressional and administrative authorizations that have helped to bring the United States' agricultural plant to the highest state of efficiency of any in the world. Important among them have been those authorizations and directives that have led to steadily increasing conservation of our soil, water, and related resources.

In the same year 1862, President Lincoln signed the homestead and Land-Grant College acts. Agricultural agencies and programs established since have covered the widest range of interest to farmers and ranchers, and to the public generally, in connection with crops and livestock, agricultural water development and management, forests and woodlands, and wildlife. They have included the 1887 Hatch act establishing the system of State agricultural experiment stations, and creation of the Agricultural Extension Service in 1914. They included the development of modern programs in the 1930's, ranging from those for technical help in soil and water conservation and agricultural conservation cost-sharing, to expanded farm credit. economic and marketing facilities, and rural electrification.

Most significant from the conservation standpoint has been the Department's more recently authorized cooperation with and providing of technical help, through the Soil Conservation Service, to farmers' and ranchers' soil conservation districts established under State laws; its technical and cost-sharing participation in small-watershed projects, through the Watershed Protection and Flood Prevention Act; and its cost-sharing assistance through the Great Plains Conservation Program. Today's accomplishments through these programs are a far cry from the soil erosion research and limited demonstration project activities begun at the turn of the thirties.

Somewhat as a 100-year-old couple may look back with fondness and pride on their children and grandchildren, so does the Department of Agriculture have reason to take satisfaction in what its "offspring" have done to improve the lot all Americans—on the land and off—since Abe Lincoln solemnized the marriage of Federal research, educational, technical, and other efforts and facilities with land users' own needs and efforts, with the State agricultural experiment station and college as life-long "best man."

Today, for example, the conservation and economical use and management of our soil, water, plant, and wildlife resources is established public policy. Translation of this policy into action on the Nation's agricultural and public lands has moved ahead with ever-increasing speed.

Approximately 92 percent of all the land in farms and 96 percent of the farms and ranches in the continental United States are now in soil conservation districts. Federal planning or operations have been authorized for hundreds of local small-watershed projects. Operators of millions of acres in the 10 Great Plains States are applying conservation measures specially tailored for that region through the Great Plains Conservation Program.

Thus it is that we move into the Department of Agriculture's second century with entirely different attitudes, knowledge, and facilities than our 19th Century forefathers had at their command. Truly, as it has been said, "The shape of the future is on the land."

Conservation Farming Overcomes Southeast's Centuries-Old Problems

By T. S. Buie

THE water which falls on the Southeast today carries less soil to the sea than at any time since the early settlers cleared the land to grow clean cultivated crops like cotton and tobacco and land exploitation began.

Early settlers in the Southeast judged whether land was fertile by the height of cane growing near streams. Where the cane grew "higher than a man's head," there they built their cabins. Two centuries later, much of the Southeast consisted of areas of ruined or depleted land, deep-washed gullies, and wornout and abandoned farms.

From Colonial times there were those in each generation who spoke out against misuse of the land, but the period of exploitation ended only with the beginning of the current conservation movement in the 1930's.

Although various farmer groups and agricultural societies active in the mid-eighteenth century made great contributions to the ideas which were later to find expression in the U.S. Department of Agriculture, it was only after little new land was left to clear that Southeastern farmers generally had showed an interest in soil saving.

Hillside ditches represented their first effort at erosion control. The object was to intercept water flowing across slopes and carry it off to the sides of the field; but, because of faulty design, they often broke, concentrating the water and causing gullying. As a result, the hillside ditches were gradually replaced by bench terraces, remnants of which still can be found in many sections of the Southeast.

Unfortunately, the design of the bench terraces was little better than that of the hillside ditches, and their shortcomings likewise resulted in gullying and other damage to the land; and the Mangum and other types were devised, including the Nichols broad-base terrace developed in 1924. For years, county agents throughout the Southeast labored long and hard to help farmers build terraces on sloping fields; but, because of inadequate instruments and equipment, many of these terraces also were ineffective.

During these years, as attention began to be given by State and Federal experiment stations to the importance of proper use and care of the soil, emphasis was usually placed on how to get the most out of the land, with little attention given to protecting and preserving the soil itself.

The installation of adequate water control and soil conservation measures on sloping land frequently require the movement of earth. Until comparatively recent years, the only power available on farms was that provided by human and animal muscle, making such earthmoving costly and burdensome, and handicapping efforts to introduce soil conservation practices on a wide scale.

Another hindrance was the absence of adequate social "tools" for the individual farmer, the scientist, and the technician to use in the solution of conservation problems.

Beginning in the 1920's and early 30's, there was a decided upsurge in public appropriations for agricultural research. One of 10

1880 picture of settler clearing land.

Note:—The author is State conservationist, soil Conservation Service, Columbia, S. C.

erosion control experiment stations, for which the first appropriation was made by Congress in 1929, was located at Statesville, N.C. Results obtained there and elsewhere were basic in the establishment of the current soil and water conservation program throughout the Southeast.

During the mid-1930's, various Federal and State agencies, like the Soil Conservation Service, were either established or expanded to provide more soil and water conservation assistance. The most notable development of this period, however, was the start of farmers' own soil conservation districts, first of which, the Brown Creek, was established in North Carolina. They provided the mechanism to enable farmers to organize for the purpose of saving their soil and to insure a more permanent agriculture for the community, and a fair standard of living for themselves and succeeding generations.

This challenge was quickly accepted by the landowners, and the creation of districts mushroomed in the Southeast, where today all of the States are entirely within districts except for one county in Virginia and a small tip of Florida. Public expenditures—for technical help, ACP cost-sharing, and other assistance—represent only a small part of the the total spent for the promotion of soil and water conservation practices. It is safe to say that during the past 25 years farmers in the Southeast have spent several billion dollars for conservation of their land and water resources.

The shifts in land use that had taken place between 1930 and 1959 in the 7 States of Alabama, Georgia, Mississippi, North and South Carolina, Tennessee, and Virginia, are significant. (Florida is omitted because of dissimilar census data.) Harvested cropland, for example, dropped from some 40⅚ million acres to only 27 million acres; while pasture increased from about 20⅙ million acres to 23¾ million acres, and woodland acreage from approximately 44 million to nearly 45½ million acres. Total farm acreage, meanwhile, declined from 122¾ million acres to about 107½ million acres.

To June 30, 1961, the SCS had helped 1,887,000 soil conservation district farmers over the country develop soil and water conservation plans. What districts have accomplished in changing the face of the Southeast is shown in the record of conservation measures they had put on the land. Representative are the more than ⅓ million miles of terraces, considerably more than a quarter of a million farm ponds, between 13½ and 13¾ million acres of pasture planted, contour stripcropping approaching half a million acres, 4½ million acres of trees planted, and more than half a million acres of wildlife areas developed.

Terraces commonly were built with mules and fresno in early conservation days.

Tractor and scraper are among machines used for terracing jobs today.

The lands of the Southeast have staged a comeback.

Now, as one travels through the Southeast, he accordingly sees on every hand this physical evidence of what has taken place. What this has meant in the lives of the people was summarized by one farmer in these words: "Since I have been farming the conservation way, I have made a good living, educated my children, and gained the respect of my neighbors."

After a Century

New Generation Takes Over

By Robert F. Tegner

W. D. "Pinky Bill" Mathews, Jr., and "Pop."

IN Scott Valley's picturesque farming area tucked away in the mountains of northern California are a father and son who are living links in a cattle business that started more than a century ago—in 1852. That was 10 years before Congress and Abraham Lincoln created the Department of Agriculture.

You get a feeling when you cross the mountains from Yreka into Scott Valley—about 20 miles or so—that something out of the West's rich past, its history of ranching and mining, still lives on here.

And so it does—in the fascinating old farmhouses; the main streets of Fort Jones, Etna, and Callahans, that look like scenery from a Hollywood western; the old isolated cabins in the gullies and on the hills; the remnants of mining that started more than a century ago when '49er fever fired men's imaginations. It lives on in names that are legend and have fascinating stories by the score associated with them.

This story is about just one of those names and the two men who share both the name and the tradition begun by the first Mathews to set foot in the valley. It is a story about how the valley changed down through the years of land clearing and plowing, and how conservation treatment today is restoring and protecting its soil and water resources.

In a modest little home on Fort Jones' main thoroughfare live W. D. Mathews, Sr.—"Pop," everybody calls him—and his wife, Gertrude. "Pop" is 88 years old. He was born January 4, 1874, the fifth of seven sons of I. S. "Matt" Mathews. He has lived in the valley all his life and is the last remaining offspring.

Elsewhere in the narrow, 35-mile-long valley—over in the southern reaches near Etna—lives his son, W. D. Mathews, Jr.—"Pinky Bill." Another son, Ed Mathews, manages the Siskiyou County Fair; and a daughter, Jewel, is the wife of a Scott Valley banker, Ernest Smith.

It was in 1851 when Pop's father, Matt Mathews, an erstwhile New York tailor's cutter turned packer, rode a saddle mule from Sawyer's Bar on the North Fork of the Salmon River across the mountains into Scott Valley. The valley, the river that meanders through it, and the bar near where it empties into the Klamath are named for John W. Scott, credited with discovering of gold there in 1850.

Listen as Pop tells the story:

"It was late summer of 1851, near as I can recall Dad telling it, that he came in with this bunch of fellers looking for the lost Cabin Mine. Some miner had come into Sawyer's Bar where Dad was headquartered, telling about this strike he had made. And he had gold, too, to prove it."

History does not indicate whether the Lost Cabin was found; but gold was, and the place soon swarmed with gold-seekers.

Matt saw something else and liked what he saw—tall, lush grass and thick brush abounding in game—a lazy, clear-running river that teemed with salmon, steelhead, and smaller trout.

Matt returned the next year and entered the cattle business, supplying meat to the miners. He set up butcher shops in the mining camps, and he went into partnership with others, including his former partner in pack-train operations on the other side of the mountains, John Fairchilds.

"As near as I can place it, Dad came to Scott Valley to stay permanently in about 1864," Pop recalls. "He bought up the first patented land in the valley from a man named Julian, who had settled on it in 1852."

That land became part of the 1,200-acre Star Ranch which Matt farmed until he turned it over to his sons—"The Mathews Brothers."

More farmers settled in Scott Valley. They cleared the land and raised cattle, hogs, sheep, and horses, which they put out on native pasture. They put in crops like wheat, oats, and hay.

"Why, I can remember as a boy," Pop said of later years, "looking out across a field of timothy so high I couldn't see my Dad aworkin' in it."

"Pinky Bill" tells a story Pop forgot—how Matt dreamed up the idea of building a plow in a blacksmith shop to turn the sod in the soggy bottom lands. Pop, "a pretty good blacksmith," did the

Note:—The author is field information specialist, Soil Conservation Service, Berkeley, Calif.

job.

In its native state, the Scott River was flanked by cottonwood and willow. Much of the valley floor was covered with wild plum, oak, pine, fir, and cedar. The river overran its banks consistently each winter, and periodically there were real floods. But the brush, trees, and grass held the soil.

After the settlers logged the watersheds and the farmers cleared the land as close to the river as they could get, the situation changed. Now the high water, unimpeded by natural vegetation, rushed down the valley, tearing out the soil and leaving debris on the croplands and mud in the farm buildings. Big floods occurred periodically from 1861 to 1941. After every flood, men and teams hauled away the trees, roots, and other debris left on the land.

Men tried to change the river. They straightened it but it only ran faster and caused more damage. They piled trees by the hundreds along areas hit worst by the rampaging river. With no modern equipment, they drove piling by hand. They even handloaded rock and hauled it with team and wagon to the river, dumping it along the ravaged banks—but to no avail. The piling rotted and tore away, the trees floated out of place, and the rock—too light for the job—rolled into the river and sank to the muddy bottom.

After a flood in 1948-49, some farmers decided it was time for new, scientifically planned action. One of them was Bill Mathews, who helped form and became a director of the board of supervisors of the Siskiyou Soil Conservation District, and is a member of the California State Soil Conservation Commission.

The Soil Conservation Service provided technicians to work with the district. They found, for one thing, that there was not enough vegetation to hold the streambanks. They decided it would be best to keep the river flowing in gentle curves to slow down its flow; and, after trying several measures, they concluded the only way to hold the banks was with heavy rock. This rock work has held, and a number of farmers are using it. The SCS also brought in new ideas on land leveling, irrigation, drainage and crop rotation systems.

Meanwhile, Bill Mathews sold the old Star Ranch and bought acreage which he figured would be more suitable for irrigation. He is experimenting with new grasses, which enable him to run 2½ head of cattle where only one animal was supported before, or about 250 head all together.

Although tradition gives way slowly, the conservation movement is gaining ground, and a new generation with new conservation technology is taking over in Scott Valley.

Conservation-managed Scott Valley more than a century after it was opened to settlement.

A Half-Century of Soil Stewardship By This Wisconsin Family

By Gerald W. Easton

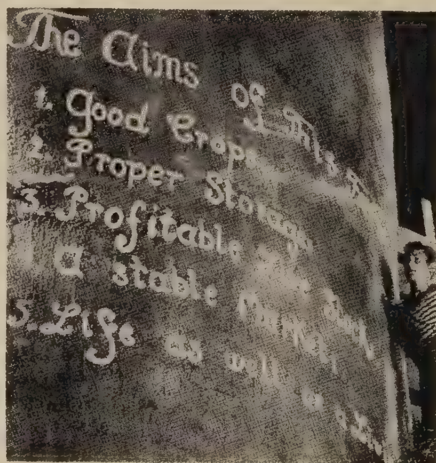
IT was 55 years ago that the Rev. W. J. Dougan gave up his ministry in Poynette and settled his family on a 115-acre farm just east of Beloit in Wisconsin's Rolling Rock County.

The 73-mile trip was a long one in 1907. They traveled in an old farm wagon that carried all their meager belongings. Trailing along behind was the family cow. Reverend Dougan and his family started farming with little more than a hoe and a plow, a horse, a crate of chickens, the cow, a mortgage, and a prayer.

But Reverend Dougan had something far more important to successful farm life. He had an ingrained love for the land, and definite goals for its use. And he was willing to work for the kind of family living that puts moral values above wealth.

The aims of the family inscribed on the silo by the elder Dougan still can be read: They are: "Good crops; proper storage; profitable livestock; a stable market; and life as well as a living." How to attain these aims was a question that often taxed the ingenuity of Reverend and Mrs. Dougan. Ronald Dougan, the elder son, who today owns and operates the farm, recalls that his parents worked methodically, never wavering in their approach to a full life.

Good crops were sought by trial and error. One of those tried was alfalfa, a much publicized crop not yet in common use in those days. The inoculation problem was handled by hauling soil from fields where legumes already had been grown to new areas. Lime and fertilizer were applied to relatively new soils, with outstanding success.



Rev. W. J. Dougan proclaimed his belief in soil stewardship by printing his aims on the silo years ago.

Proper storage, to retain the feed value of hay and grain for livestock, was almost as difficult to master as raising good crops. The Dougans' first storage space was a round barn. Its roundness added to its convenience and the efficiency of its use. Other storage buildings followed, each planned for maximum efficiency.

Ronald remembers when his father, although in debt, set about to improve his livestock. He hesitantly approached local bank officials for further financing. His reputation for honesty, hard work, and his firm determination to make good on his goals stood him in good stead. The bank did not hesitate; and, with a sizable loan, he was able to buy a foundation herd of 20 Guernseys.

When the Dougans began their dairying operations, they found the market anything but stable. But, by establishing a bottle milk business in Beloit and starting a small delivery route, they were able to make a go of it. The Dougans' milk wagon soon came to be a familiar sight, and the farmer-minister became known as "Daddy Dougan" to all the youngsters on his route.

Family, church, and community affairs took a regular place in the Dougans' lives. The 4-H program was important to the two boys, and Mom and Dad had time to give an "assist" whenever it was needed.

Today, the resources and operations of this Rock County farm have multiplied several times over from those of half a century ago. Instead of its 115 acres, 20 cows, a small milk room, and a modest milk route, the farm now totals 550 soil and water conservation treated and managed acres, 120 milk cows and a total herd of 230 animals, and 11 big milk routes with 30 employees to take care of the farm's operations. It also is one of the leading southern Wisconsin seed corn producing and processing farms.

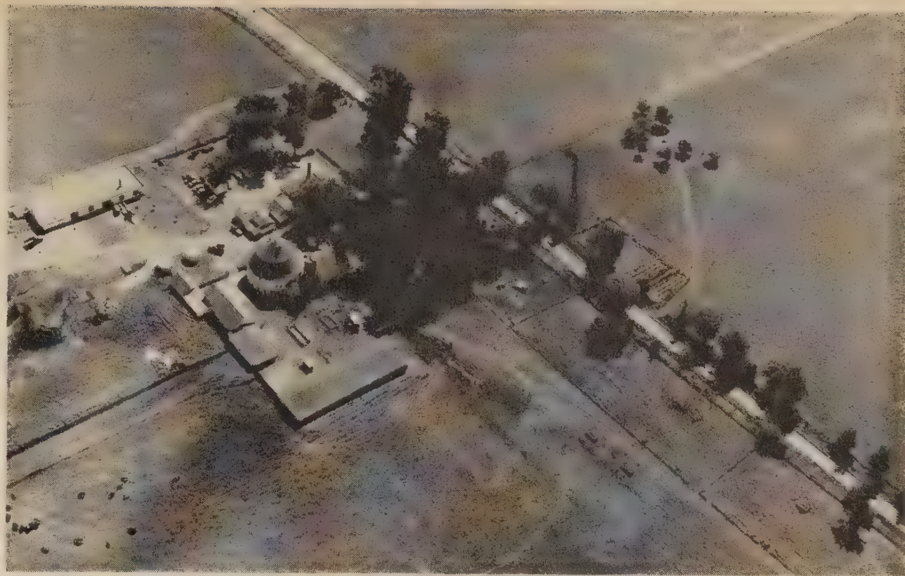
Like his father, Ronald works toward the aims inscribed on the silo long years ago. But, unlike his father, he doesn't have to depend upon chance to achieve his goals. Scientific farming developments play a big part in his "life as well as living." So do modern conservation-farming methods, un-

Note:—The author is work unit conservationist, Soil Conservation Service, Lancaster, Wis.

known to the elder Dougans.

When Rock County farmers organized their soil conservation district in 1949, Ronald Dougan was one of the first to adopt newly advocated erosion-control measures. Like his father, he feels the soil is "alive."

"I have been placed in charge of the soil, not as an owner, but as a steward," Ronald says. "I want to pass this gift of God on to future generations in as good or better shape than it was when I received it."


Dougan's round barn is the hub of his operations. (Milk bottling plant partly hidden by trees.)

The son's actions show his feeling toward soil conservation—his awareness of his own everyday conservation needs, and his purpose of doing something about them. This past year, for example, he added 60 acres to his farm—a rundown tract regarded by his neighbors as almost having reached the point of no return. His first move was to ask the soil conservation district for technical help from the Soil Conservation Service. As a result, he already has built 3 miles of terraces and 1½ miles of grassed waterways, to make the water "walk down the hill," as he expresses it, and to make more of it available for crop production.

In the restless, searching spirit of his father, Ronald Dougan still is trying new varieties of crops and crossbreeding cattle for more efficient production. A true conservationist and nature lover, he rarely leaves his house without his field glasses. To increase wildlife on his farm, he has built a farm pond and planted pine trees and wild shrubs around it. Other conservation projects are in the making, with the end "not in sight," Douyan says.

The efforts of the late elder Dougans are not forgotten. You will find their names inscribed as "Master Farmers" for outstanding achievement and on the farm honor roll at the Wisconsin College of Agriculture—fitting tribute to a courageous couple. In their love of God and His precious gift to man of soil and its rewarding resources, the religiously rooted Dougan family has molded a pattern for generations ahead to follow.

■


The Dougan farm, showing terraces, erosion-control structure, and wildlife area development around pond.

"In observing these events," Secretary of Agriculture Orville L. Freeman said of Rural Life Sunday, May 21, and Soil Stewardship Week running through June 3, "all of us should reflect upon the blessings that have come from the richness of our land and the skill of our people.

"We should express special thanks for our great human and natural resources, be appreciative for our vast agricultural abundance, and seek ways of working together to improve and conserve these precious gifts of the Creator."

Many church and agricultural groups traditionally observe Rural Life Sunday and Soil Stewardship week, with special sermons, programs, and other activities.

Farming History

IN OLD TILE

By M. M. Weaver and Marion G. Leiby

TILE drainage has kept pace with the rest of agriculture during the last century. Today it is an important means of bringing about efficient conservation land use on fields brought into cultivation through the years since the country's earliest settlement.

Tile has been used since 1835, when John Johnston, "Father of Tile Drainage," first tiled his farm at Geneva, N. Y. Because of the results he obtained, the practice spread rapidly. From New York to Maryland and elsewhere in the humid areas of the country a history of farming can be written from their tile. The evolution in the kind of tile has marked the evolution in farming itself.

A rather simple tile manufacturing machine from England was delivered at Geneva in 1848 at a cost of 47 pounds and 1 shilling, and was placed with B. F. Whartenby of Waterloo, N. Y. It was capable of making from 4,000 to 6,000 tile a day. They sold for less than a cent apiece. This machine was operated by 2 boys and 2 men.

Harvey Jackson, still farming at 85, with old tile replaced by modern tile.

A modern tile factory can now turn out 100,000 tile a day. We had reached an estimated 300 million feet of tile production in 1959.

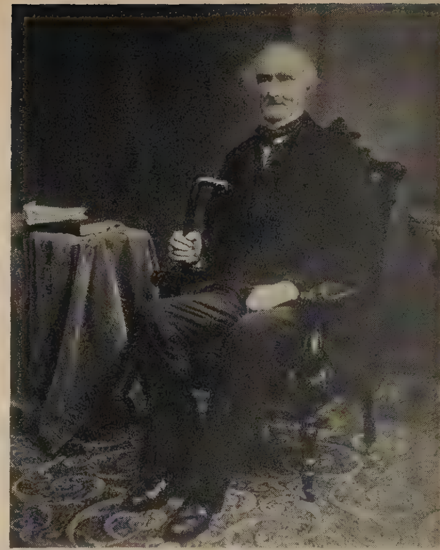
A hundred years ago, tile as small as ¾ inch diameter was used. The usual size for laterals was 2 inches. Today, we commonly use 4- to 8-inch tile.

From 1850 to 1859 there were 66 tile factories established in the United States; from 1860 to 1869, 234; and from 1870 to 1879, 840. By 1880, there were 1,140 factories in operation in 8 States in which they were recorded—Indiana, Illinois, Ohio, Michigan, Iowa, Wisconsin, New York, and Pennsylvania.

Prior to 1859, Pratt and Bro. of Canadaigua, N. Y., patented a horse-powered wheel-type tile trencher. Other early trenching machines included the Blickenderfer, Hickok, Rennie Elevator Ditcher (patented in 1869), and Johnson. The first steam operated machine, the Plumb, was used successfully in 1883.

Before 1862, almost all tile trench was dug by hand. Improvements in handtools before 1880 increased the ease of digging. In 1885, 50 years after Johnston laid his first tile, the dipper dredge was invented, making possible the digging of large ditches, into which the tile drained, at a low cost.

Queen Anne's County, Md., provides a good example of the early-day tile drainage and present-day tiling in conservation farming. Some oldtimers believe tiling in the county dates back to the Civil War or before. If early farmers in this county followed conventional practices of their day, hollow logs and rock drains were forerunners of tile.



John Johnston—"Father of Tile Drainage."

Harvey A. Jackson, still farming at 85, has tile which was laid about 10 years before World War I. Some of his old tile still work.

Jackson watched the Queen Anne's Soil Conservation District's tile-trenching machine with interest as it opened a trench 20 inches wide and 4½ feet deep when he had to replace some 4-inch horseshoe tile with 6-inch clay tile.

"The last time I dug that tile up," he said, "it took me nearly a week with three men, and here this machine has done the job in 3 hours. I'd say times have changed."

This trench cost 15 cents a foot with the trencher, compared to 50 cents a foot it would have cost by hand. The saving about covered the cost of the new tile.

Jackson's tile drains a wet area too large to farm around, yet too close to the farm buildings for wetland wildlife development, consistently taken into consideration in conservation farm planning.

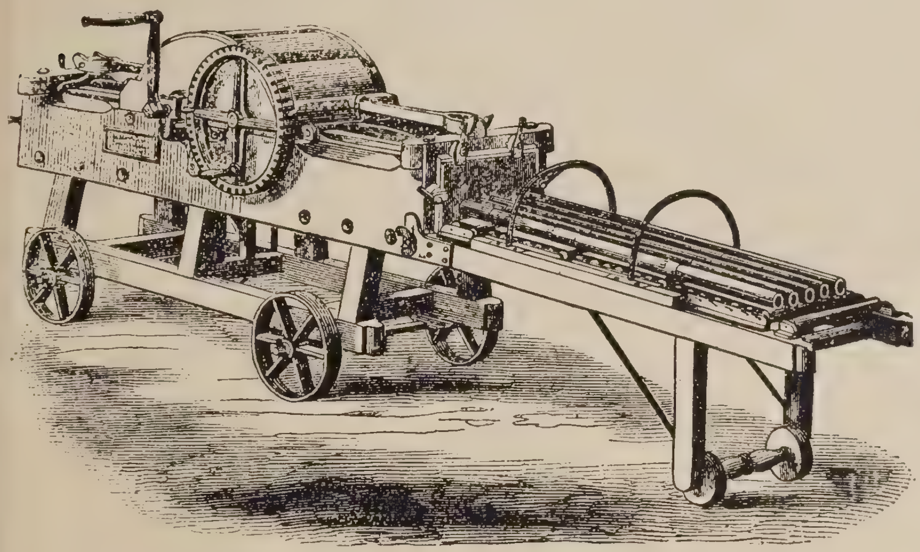
There were wet areas on several farms in the county last year alone,

Note:—The authors are engineering specialist, Waterloo, N. Y., and conservation aid, Centreville, Md., both of the Soil Conservation Service.

for example, that the Soil Conservation Service technicians recommended be retained for wetland development.

The oldest tile specimens that have been found in Queen Anne's County are 2- and 4-inch horseshoe-shaped tile with flat bottoms. These early gave way to a hexagon-shaped tile with round core; and there was a short period during which locally made round concrete tile also was used. The trend locally the last 40 years has been to use round clay or shale tile.

Fifty years ago, in the days of light, horse-drawn farm equipment, tile was laid in the middle zone a few inches below plow depth. Today, it is laid near the bottom of the root zone of average farm crops. As a result, the effective zone, or "cone of drawdown," is wider, lines may be placed farther apart, and the tile is protected against crushing by today's heavier farm equipment. Greater depth also gives more effective drainage.



SCRAGG'S PATENT TILE MACHINE.
First tile-making machine imported into the United States.

Modern tile-laying machine operating on Carl Werner farm, Church Hill, Md.

100 YEARS AGO

"Whilst our national pride is gratified in comptemplating such a greatly increased production, it must occur to every reflecting mind that under our present mode of agriculture, it may be at the expense of the soil. But few greater calamities could befall a nation than the impoverishment of its lands. Virginia stands as a lesson to the other States. Her unskillful tobacco cultivation ruined the finest portions of her territory. As in Palestine and other countries of the east, now barren from the destruction of their soil by reckless cultivation, our lands once destroyed remain so, and thus the territorial limits of our States are in fact diminshed. Nations wage wars in vindication of their right to a few acres, but permit the destruction of many from want of knowledge in the farmer.

"In the absence of an account in the census returns of the acres of pasture lands, and of the ploughed acres, it is difficult to determine the extent of the deterioration of our soils by these immense annual crops. It must be great. Still we know that our agriculturists are aware of this evil, and that the use of fertilizers is rapidly increasing ....The increase of clover seeds during the last decade has been one hundred per cent, and of grass seeds one hundred and sixteen per cent. This would have added not less than twenty-six millions of acres to our pasture and meadow lands, had it not been for the greatly increased exportation of seeds. This exportation was but $13,570 in 1855, and in 1861 $1,063,141; but in 1862 it fell as low as $299,255. The increase of our improved lands from 1850 to 1860 has been about fifty millions of acres; that of clover and grass seeds should have been sufficient to have seeded that number of acres."

—From Report of the Commissioner of Agriculture for the Year 1862 to the 37th Congress.

Conservation Legislation

By M

Marvin Jones.

THE principle that conservation of our soil and water resources is essential to the preservation of the Nation is not a new idea, but years of experimentation, demonstration, and patient work were required to gain public acceptance of that principle.

Beginning in 1903, for example, the U.S. Department of Agriculture began preliminary studies of farm terracing. Some work along this line was done through the subsequent years; but it was not until 1929 that the Congress authorized the Secretary of Agriculture to conduct soil erosion investigations, including the study of terracing and other control measures. Additional appropriations were made in succeeding years.

Note:—The author is Chief Judge, U.S. Court of Claims, and was Chairman of the House Committee on Agriculture from 1931 to 1941.

Before the present Soil Conservation Service was created, congressional leaders, conservationists, and many other thoughtful people became alarmed at the extensive damage that was being suffered throughout the Great Plains in the area known as the "Dust Bowl," covering parts of five Southwestern States and, to some extent, other areas of the Southwest which underwent a long period of drought beginning in the fall of 1932. Very little was known at that time, however, about the control of wind erosion. At my suggestion, H. H. Bennett, the director of the agency then known as the Soil Erosion Service, established in 1934 a demonstration project to control wind erosion on an area of approximately 50,000 acres near Dalhart, Tex.

Early in 1935, two proposed bills were sent to the Congress—one by the Department of Agriculture to the House Committee on Agriculture, and one by the Department of Interior to the Public Lands Committee. There was still disagreement between the two departments. Neither of these bills contained any provision to cover dryland erosion by wind, both being limited in large measure to soil erosion by water.

Congressman Jack Dempsey of New Mexico and I took these two bills, broadened them to cover erosion both by wind and water, and extended the proposed conservation activities in other respects. We then jointly introduced the expanded bill at the same time. The Committee on Agriculture reported it, and it was passed unanimously by the House and by the Senate, and was approved by the President on April 27, 1935.

Early in the same year, 1935, a group of county judges, commissioners, farmers, and ranchers from the Panhandle of Texas met in the County Courthouse at Dumas, during one of the worst storms in the history of the "Dust Bowl." Under the stress of necessity and the need for immediate action, they

Typical of former wind erosion scenes in Texas and other Great Plains States.

Sparked By "Dust Bowl"

ones

drafted a pioneer piece of legislation which was enacted by the State Legislature on May 21, 1935. The State act authorized the creation of wind erosion conservation districts.

This act gave the district officials authority to enter upon and treat neglected lands which constituted an erosion hazard. It set aside 20 percent of the State automobile registration fees, as well as a part of the State ad valorem taxes, for the purposes authorized. Wind erosion districts were promptly created in nine Texas Panhandle counties. Soon thereafter a committee from the newly formed districts came to see me. It was made up of Wilson Cowen, Noel McDade, and Mal Stewart, county judges of Dallam, Moore, and Deaf Smith counties, and J.O. Guleke and John E. Hill of Amarillo. I arranged a conference with various officials of the Department of Agriculture, including M.L. Wilson, Under Secretary of Agriculture, Dr. Bennett, chief of the newly created Soil Conservation Service, and others.

As a result of this meeting, the wind erosion districts and the Soil Conservation Service entered into a cooperative program under which the Soil Conservation Service agreed to furnish technical assistance and to loan the districts some machinery and materials for carrying out the provisions of the Texas act. Very little had been done about the control of wind erosion at the time, and the agreement between the Service and the nine Panhandle districts represented what was perhaps the first concrete effort by State and Federal agencies working in cooperation to combat the problem.

When the President's Great Plains Committee visited the Panhandle of Texas, they expressed great interest in the action which had been taken, and when their report, "The Future of the Great Plains," was published in December 1936, it had this to say regarding the program then being conducted in the Panhandle Wind Erosion Conservation Districts:

"It should be emphasized that the legislation adopted in Texas, despite the shortcomings indicated above, represents, nevertheless, the furthest advance which any State has made so far in the direction of establishing significant State programs for the control of soil erosion. The State has been a pioneer, and it need not be wondered that the initial efforts indicate room for improvement. . ."

On May 13, 1936, after the Texas program had already been put in operation, the Department of Agriculture completed its draft of a standard form of a State Soil Conservation District Law, copies of which were transmitted by President Franklin D. Roosevelt to the governors of the various States asking their aid in the passage of the standard act in their States.

Happily, all of the States wisely passed enabling legislation patterned after the standard act, under which the present 2,900 districts are operating and in the promotion of which the National Association of Soil and Water Convation Districts is being operated.

The foundation for all of these operations is found in the National Soil Conservation Act approved by the President on April 27, 1935, which authorizes the various States and the national Government to jointly attack this tremendous national problem in which every man, woman, and child in the United States is vitally interested. The first of the new districts, which are now operating so effectively, was organized in 1937. The organization spread rapidly until it covers most of the land in our country.

Millions of acres in the Plains today are protected by stripcropping and other conservation measures.

Octogenarian *"Village Blacksmith"* Forges Conservation Links

By R. C. Barre

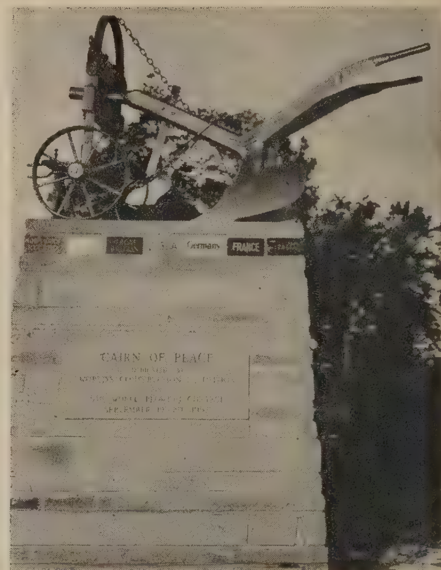
EIGHTY-six-year-old Everett Haas is conspicuous in the fast-declining ranks of ''village smithys'' because he has turned forge and anvil to the cause of soil and water conservation.

Haas, who has worked at the blacksmith trade in Ash Ridge, Ohio, for 67 years, accepted the assignment in 1957 to build the plow, with the help of his son, Tod, for the ''Cairn of Peace'' dedicated at Peebles, Ohio, when the United States was host to the 5th World's Conservation Exposition and Plowing Contests. The job involved unaccustomed research for a blacksmith, of library books on plows. He happened to have a book with pictures of plows dating back to the 13th century. He also searched in junk yards for plow parts.

Haas and his son, sharpen 600 to 800 plow shares each season. Years ago, Tod said, they wouldn't have had more than 25 to 30 in a season. The senior Haas has a hand painted picture in his shop of a plow he made, and pictures of the plow being pulled by a team of oxen.

''When I started,'' Tod Haas recalled, ''if a man raised 20-25 acres of corn he was a big operator; and now, if he doesn't have 75-100 acres, he doesn't consider himself fully employed.''

''We weld the antiseep collars on the pipes for farm ponds built under the soil conservation program,'' Tod commented.



The Cairn of Peace.

His son-in-law, Harold Yockey, has a bulldozer and does conservation contracting work on conservation ponds and drainage system improvement ditches, including work in the Brown County Soil and Water Conservation District, planned with Soil Conservation Service technical help.

Everett Haas in his blacksmith shop.

Unveiling of a ''Cairn of Peace'' is one of the highlights of each World Plowing Contest. The cairn is topped with stones from each country, brought to the site by the competing plowing teams, and is topped with the ''Golden Plow''—emblem of world supremacy in the act and skill of plowmanship. Flags from all competing countries are flown in an arc around the monument during the event.

The plow created by Everett and Tod Haas from a photograph of a plow made in Holland in the 17th century is a nearly exact reproduction.

When the World Plowing Organization was formed in 1953,

Note:—The author is area conservationist, Soil Conservation Service, Hillsboro, Ohio.

serious consideration was given to the exact nature of the trophy which would symbolize the basic plow. In order to show strict impartiality toward the farm machinery industry throughout the world, the 18th century Norfolk Plow—a walking plow mounted on two wheels—was chosen as the model for the golden miniature trophy for which the plowmen compete. Cairns have now been placed in Canada, the Republic of Ireland, Sweden, England, the United States, West Germany, Northern Ireland, Italy, and France. The next, in 1962, will be placed in the Netherlands on October 5.

The Norfolk plow was patterned from a light-weight plow developed by the Dutch early in the 17th century, with which 2 horses and 1 man could plow an acre in 1 day. Earlier plows were clumsy tools pulled by 10 or 12 oxen, with 2 men needed to operate them.

The inscription on the "Golden Plow" trophy reads "Pax Arva Colat," meaning "Let Peace Cultivate the Fields." The plow—the key that unlocks the fertility of the soil—remains the basic instrument of food production, but the land is the most important of man's possessions. In addition to promoting plowing skill and mechanical progress, these contests have encouraged better land use.

Centennial of Stripcropping

By Glenn D. Garvey

A century of stripcropping in Wisconsin's La Crosse County confirms the sage observation that "all our past acclaims our future."

Over the country generally, contour and wind stripcropping date back to the start of the modern national action program of soil and water conservation in the 1930's. But not so in Mormon Coulee in the hilly Coulee region of the State. When the pioneers, shortly after the Civil War, were poling their families up the Mississippi River in keel boats to land at "Prairie La Cross" and mingle with Chief Decorah's Winnebagoes, stripcropping already was "old hat" to the farmers in the Coulee outside of La Crosse.

The "new" stripcropping method of farming—new in the late 1860's that is—was and is to be found on the Herbert Kramer farm lying against a steep sidehill in Mormon Coulee. It looks nearly as good today as when farming began in this area in post-Civil War days. The soil on this farm is living proof that it is possible to keep land "new" with conservation practices. This farm is almost unique, because it is one on which conservation was used *before,* not after, the land was eroded or the soil exhausted, as so often is the situation encountered by Soil Conservation Service technicians, in soil conservation districts and out.

August Kramer—German immigrant, Midwestern pioneer, and grandfather of the present owner of this remarkable farm—had the foresight to realize that the steep sidehills of the Coulee region could not be farmed safely in the manner conventionally practiced in his newly adopted land. He was convinced that what was to become the big "Corn Belt"-type farming, with fields all opened at once, just wouldn't work. Not on land this steep.

But August Kramer figured that, by alternating cultivated crops


Narrow strips on Kramer farm show up on hillside in center.

Note:—The author is soil conservationist, Soil Conservation Service, La Crosse, Wis.

with strips of hay, the runoff water could be slowed down and given time to soak into the soil. These hay strips also would add organic matter, or "body," to the soil. This way, the soil structure would be maintained and, when plowed, would be able to withstand the beating of the rain and the pressure of the runoff water. The soils in this area are deep silts, soft and friable—the kind that melt like sugar when any great amount of water washes over them—but are good soils well worth the little trouble it takes to save them.

Kramer's first attempt at stripping didn't satisfy him. He still saw some "washing" in his fields, and figured that the rushing water got too much of a start if the strips were wide. So he narrowed them. Although most of the strips in La Crosse and the surrounding area today are 60 to 100 feet wide, the Kramer strips still average only 25 to 35 feet in width, to slow the speed of the flowing water to a point where it can soak into the deep silt soils rather than run off. The idea seemed to work, so the entire farm was laid out in narrow strips.

In the early 1900's, the need for better land use over the entire country was becoming more apparent. Farmland in Wisconsin which had been in virgin timber 40 to 50 years before was badly gullied, and sheet erosion was rapidly ruining the little remaining topsoil.

The Upper Mississippi Valley Experiment Station was established in 1931 near Grandad Bluff at La Crosse, to find answers to these and other soil and water-waste problems. It was a place where people could go and actually see the results of soil conservation research. The first director of the station went down into Mormon Coulee and studied the results of the early stripcropping there. He noted the lack of sheet erosion on the steep stripcropped fields of the Kramer and other farms, and decided to set up plots with strips of various widths, to get an actual measurement of comparative runoff and soil losses.

The plots were laid out on the Hubert Hundt farm near Coon Valley, with strip widths of 50, 100, 125, and 150 feet. They were put into a rotation of 1 year of corn and a year of grain, followed by 2 years of hay. After these plots were in operation for 12 years, the yearly soil loss on the 50-foot-wide strip was only 1.4 tons to the acre, as compared to 2.62 tons on the 100-foot strip, 3.18 tons on the 125-foot strip, and 3.25 tons on the 150-foot strip.


12-plus inches of highly erodible silt loam topsoil on 22 percent slope after nearly 100 years of stripcropping on Kramer farm.

These plots thus showed beyond question that the width of the strips had a definite effect on soil loss. This experiment also showed that the pioneers of Mormon Coulee were on the right track when they stripped their steeper sidehills, with those who stuck to the narrower strips suffering even less soil loss.

Today, after more than 90 years of being farmed, a full foot of highly erodible silt loam topsoil remains on up to 22 percent slopes on the Herbert Kramer farm—and, he says, "We don't have so much as a 'dimple' in any of our fields."


Herbert Kramer and son, Jerry, with hillside strips today.

Centennial Movie

"Our Land—Its Many Faces" is the title of a 13½-minute, color, Soil Conservation Service movie to be introduced soon through television stations. It traces changes in the pattern of U.S. land use since the day of Thomas Jefferson. Prints will be available later at State SCS motion picture libraries.

Soil and Water Research
SPANS A CENTURY

Soil moisture is measured today by neutron moisture probe, using atomic radiation.

By Carl W. Carlson

EARLY soil and water management practices in the United States were developed from research conducted in Europe.

But this arrangement did not work too well, because the climate and soils in this country were much different from those in western Europe. However, in those days no one was too concerned, because soil and water resources were abundant; and, because of these abundant resources, interest in soil and water research was slow to develop in this country.

Back in Civil War days a century ago, several outstanding scientists already were emphasizing that ''wornout'' soils were being abandoned at an alarming rate, and that the land slopes were eroding away. Only a few American farmers listened to their warnings, however, and even fewer understood. Most of them were not ready to apply science to their farming operations.

In the years that followed, some field experiments were begun; and, by 1890, many studies with lime, fertilizer, crop rotations, tillage, drainage, and irrigation were under way, based mainly on trial-and-error methods.

During the next two decades, American scientists working on the physics of water in the soil, became known internationally. The first scientific understanding of soil erosion processes was advanced. Soil texture—the relative amounts of sand, silt, and clay—was first recognized as important to plant growth.

Early runoff and erosion measuring plots in New Jersey no longer in existence.

Scientists during this period found that applying nutrients to the soil in the amount removed by a crop was not the answer to soil fertility problems. Chemistry of soils was advancing, and scientists were predicting that countries depending upon wheat bread for their diet could survive only if a source of nitrogen was found. These workers preferred that methods of nitrogen fixation of atmosphere nitrogen by chemical processes be developed as this source.

About this same time, the first attempts were made to develop coefficients for use in designing farmers' drains. Studies of methods for controlling excess rainfall and preventing gully formation were in progress. Level terraces were included, for the first time, in these experiments. Woods or pastures were used for terrace outlets, to avoid concentration of runoff.

A nationwide system of soil classification began to be developed, that would allow not only for the orderly planning of soil research, but also for the application of the research results to the farmers' fields.

Field and greenhouse experi-

Note:—The author is assistant director for soil management, Soil and Water Conservation Research Division, Agricultural Research Service, Beltsville, Md.

ments conducted during this time showed that some soils required nitrogen, phosphorus, and potassium. Other soils responded only to one or, in some cases, two of these three important elements. The phosphorus fertilizer used at that time was mined in the United States, but the nitrogen had to be shipped from South America and the potassium from Germany.

By 1912, homesteading in the United States was about ended, and agriculture was spread over a wide area. Many leaders in the field of soil and water felt that agriculture was spread over more land than was needed, and that many unsuitable soils had been developed in the movement. Soil problems such as wind and water erosion, declining soil fertility, loss of soil structure, and poor surface and subsurface drainage were developing rapidly. Many farming operations were exploitative; and plans appeared to be only on a short-run basis, despite scientists' warnings.

World War I brought great demands for food and fiber, and high prices. Under such conditions, even poor managers on unresponsive soils could stay in business. What should have been a gradual adjustment, starting about 1910, began precipitously when the war was over. Agriculture was depressed, but lowering production either on the acreage or yield basis was unpopular with the public. With lowered farm income came further depletion of the soil and water resources.

By this time, soil and water conservation research was becoming established in most of the country. The national soil survey was well under way. Potassium fertilizer, not available from Germany during the war, now was being obtained from deposits in the United States.

During the 1920's, soil erosion studies, started earlier in Missouri, were expanded, and the hydraulic characteristics of drainage channels were evaluated. Hydraulic flow in drain and tile pipes was studied. Experiments to determine the value of various types of terraces were in progress.

Rainfall simulator enables soil erosion researchers to collect several years' data in single year.

Even with these activities, public interest in soil and water problems spread slowly. Agriculture was said to be overproducing already. About 1925, H. H. Bennett, who had been ''preaching'' against soil erosion for many years, began writing more dramatically about the damage resulting from poor management of our soil and water resources. His dogged campaign did much to awaken the country to the problem; and by the mid-1930's, a team approach had been developed on principles and techniques that could be used to help solve soil and water conservation problems. These ''teams'' studied such factors as the erosive power of rain, ground cover and mulch practices to control erosion, and the influence of degree and length of slope on the loss of soil and water.

At this time, watershed treatments were recognized to have a great deal to do with downstream flooding. Several watersheds were selected throughout the United States for study of the factors governing their hydrology. An evaluation of procedures for reliable flood prediction also was included.

During this period, American scientists showed that clay particles were crystalline and could be identified with X-ray, and the fixation of atmospheric nitrogen by catalytic combination of nitrogen and hydrogen to form ammonium was developed. The field of soil physics also came into its own during the 1930's, with methods developed for measuring soil moisture, and the hydraulic conductivity of the soil.

As a result of the Great Plains drought in the 1930's, an expanded basic research program was initiated in 1947 to study the principles involved in wind erosion. Principles determined in these studies have been widely used to develop conservation control measures on the land.

Radioactive materials were used in the 1950's to determine how much of the nutrient in the plant came from the applied fertilizer and how much from the soil. Incubation tests were developed to estimate the nitrogen requirements of various soils. These developments gave more meaning to fertilizer recommendations made to farmers.

Equipment and apparatus used in soil and water conservation research have undergone radical changes in the past 100, 50, and even 20 years. Soil-moisture measurements now can be made by the use of atomic radiation. Multiple-channeled recorders today make it possible to measure many factors on the same experiment. Interpretation of experimental results has been simplified by high speed computors and other data-analyzing techniques.

There also have been rapid advances in the equipment industry that have made possible once prohibitive earthmoving, water control, and other practices.

Although a considerable knowledge of our soil and water resources has been gained through research, there is still much that is not known or understood; and continuing research is essential.

GRASS ALONG THE BITTERROOT

By C. A. Rose

THE mainly grass-and-livestock farming in Montana's Bitterroot Valley is at last on a sound and conservation-guided basis after a century and a half of trial marked mostly by disappointment.

Local agricultural history had its buckskin beginning in the valley when Captain William Clark made note of the valley's "poor and stony soils" in his diary of the 1805-06 expedition with Meriwether Lewis.

The valley flanks the Bitterroot River for nearly 100 miles in the southwestern part of the State. The rugged Bitterroot Range on the west casts an effective rain shadow. Rainfall averages 12 to 13 inches a year in the lower valley, and 17 inches in the upper part.

Irrigation came to the valley in 1841, when the Jesuit missionary, Pierre Jean DeSmet, taught the Indians to grow potatoes and grain by applying water on their lands. Settlers moved in 10 years later and added to the development. Near the century's turn, there was a brief orchard boom, which made a drastic change in the ownership pattern. It was the idea then that 10 acres in orchard would yield a good living.

Livestock stayed in the valley, however; and, when the orchard boom had died, grazing pressure expanded. Farmers found that, by irrigating the old orchard tracts, they could grow better grasses. About 2 acres of bluegrass could sustain a cow and her calf from 4 to 5 months.

Developing irrigated pastures became a principal aim of the Bitterroot Soil Conservation District farmers and ranchers when they formed the district in 1941. The district's supervisors agreed the area's destiny lay in better pastures. Soil Conservation Service technicians working with the district agreed, and soil surveys showed their conclusion to be right. Rancher Fred Porch on Upper Three-mile Creek offered his land for trial seedings, in a checkerboard pattern of smooth bromegrass, tall fescue, meadow fescue, orchardgrass, Russian wildrye, tall oatgrass, timothy, Ladak alfalfa, and Alsike clover, under irrigation

Bailey's Herefords are grazing in rotation.

2-year-old irrigated pasture on land Rancher Homer Bailey said had not paid taxes for 25 years before.

at 10-day intervals.

When Porch turned a few of his cattle in on the plantings about May 1, 1944, they grazed the new grass plantings rather than adjoining alfalfa and bluegrass. Clippings and weighings showed that bromegrass gave the highest yield—more than 3 tons an acre, with the tall fescue, meadow fescue, tall oatgrass, and orchardgrass close behind. Timothy yielded 2 tons an acre. Farmers also began using fertilizer on their pasture plantings, finding production increased up to twice as much as that without fertilizer.

The Homer Bailey ranch provides a good example of improved conservation pasture management. In 1950, Bailey packed a good seedbed and seeded smooth brome, Alta fescue, orchardgrass, and Ladino clover on 28 acres that "had never paid its taxes." He fenced off four 7-acre pastures, irrigated as needed, and mowed weeds once.

"When the production went to 600 pounds an acre, I was satisfied," Bailey said of the gains he is realizing today, after stepping up the number of grazing animals on his pastures and still cutting much of the grass for hay.

Not all of the irrigated land in the Bitterroot Valley is tillable.

Note:—The author is work unit conservationist, Soil Conservation Service, Hamilton, Mont.

Thousands of acres are too stony. Kentucky bluegrass and white clover are at home in these areas.

Significant of a century or more in the grassland cycle in this area is the fact that the agricultural census in 1949 showed only 10,745 acres of improved pasture in the valley; whereas the 1959 census showed 30,000 acres—or treble the acreage of a decade before—and the potential in pasture development and management in Bitterroot Valley is still far from being realized.

Conservation Helps Lick Century-Old Sedimentation Bugaboo

By John N. Holeman

WE can protect our reservoirs and harbors from the more than century-old problem of their being clogged with sediment fed into them by soil erosion on their watersheds. At least that is the plain conclusion to be drawn from up-to-date resurveys of selected sedimentation trouble spots in Maryland and elsewhere in the country.

Each year, more sediment is removed from our rivers and harbors than the entire volume of material removed during excavation at the Panama Canal—566 million cubic yards as against 328½ cubic yards. Such dredging operations have been carried on in some Maryland and other waters since the early 1800's.

The Soil Conservation Service long has recognized that the most economical way of reducing such sedimentation damages is to hold the soil at its source. It has been shown many times over that, by applying conservation land-treatment measures and using the land within its capabilities, the sediment yield from a watershed can be reduced to tolerable limits. Such measures include contouring, stripcropping, terracing, grassed waterways, gully control, crop rotations, and crop residue management, along with grass and tree plantings, and farm ponds, in combinations which may be needed to fit particular situations.

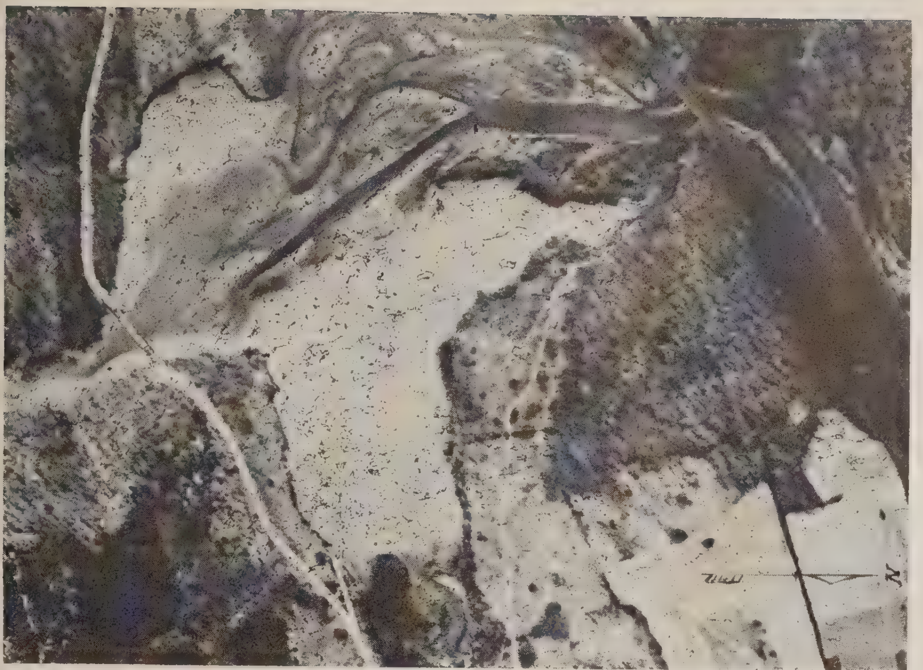
Loch Raven Reservoir with sediment deposits (top) encroaching upon its open water—1938.

The SCS has resurveyed several reservoirs below watersheds which have had these conservation measures applied on them, and has found the yield of sediment has been reduced substantially. Examples of this reduction include the Gunpowder Falls watershed in Maryland, Lake Newman in Georgia, Highpoint Reservoir in North Carolina, and Lake Waco in Texas.

Sediment yield to Loch Raven on the Gunpowder Falls, for example, dropped from 185 acre-feet annually from 1914 to 1943 to only 41 acre-feet a year from 1944 to 1961, or less than one-fourth of the former amount. The sediment yield at Prettyboy Reservoir, also on Gunpowder Falls, meanwhile, dropped from 54.2 to 30.3 acre-feet.

The 1961 survey of these reservoirs substantiated the effectiveness of the watershed-protection method of sediment reduction. In 1943, it was recognized that the greatest amount of sediment in

Note:—The author is geologist, Soil Conservation Service, Beltsville, Md.



Only 5 years later.—Note how sediment had formed a large bar (upper left) and almost choked outlet in foreground.

these two reservoirs came from sheet erosion on cultivated summit uplands. (See "Sedimentation in a Great Harbor," SOIL CONSERVATION, July 1944.) Since then, there has been a big change in land use, with many conservation measures put into practice on the watershed and a substantial acreage going out of cultivation.

The SCS estimates that of the land currently in cultivation, 22 percent has the benefit of conservation crop rotations, 17 percent of stripcropping, 22 percent of contouring, and 2 percent of cover cropping—in addition to other conservation practices. It was the sediment from this watershed which, in the early 18th century, choked the harbor of the most properous seaport of Maryland—Joppa Town—resulting in its decline and final abandonment.

Elk Ridge Landing was established near the head of navigation on the Maryland Patapsco estuary and was a shipping center before the first house was built in Baltimore. Today, the head of navigation has moved about 7 miles downstream to the Hanover Street Bridge at Baltimore. The Coast and Geodetic Survey Chart of 1845 showed the Patapsco to be 17 feet deep along the left bank under the bridge. By 1898, it was only 3½ feet deep, and by 1924 only 6 inches deep!

The Federal Government began dredging the Patapsco estuary in 1836, and has continued to do so ever since. By 1960, almost $26 million of Federal money had been spent in keeping the port open; and about 141 million cubic yards of material had been removed from Baltimore Harbor. In the 20 years from 1940 to 1960, dredging from Baltimore Harbor totaled more than 30 million cubic yards, costing almost $10 million. Twenty-one percent of the yardage removed during 124 years has been in the last 20 years, representing about 38 percent of the total cost.

Fortunately, indications are that sedimentation from the Patapsco has decreased in the past 5 years. The quantity of sediment dredged from Baltimore Harbor from 1955 to 1960 was 3.8 million cubic yards, with no new protective work. In the preceding 5 years, 5.2 million cubic yards of sediment was removed in maintenance, and 3.7 million cubic yards in new work.

Sediment accumulation in Baltimore's water-supply reservoirs also has been a continuing expense. In 1862—just a century ago—the city's first water-supply reservoir, Lake Roland, was built on Jones Falls, with a storage capacity of 400 million gallons. It became

1957 view shows reservoir water further displaced (center) by accumulated sediment, with brush now growing on higher fill.

necessary to begin sediment removal within only 10 years, and, in spite of the dredging of 434,000 cubic yards of sediment from the lake by 1900, the sediment-choked reservoir finally was abandoned in 1915.

A similar sequence beset Old Loch Raven Reservoir, completed on Gunpowder Falls in 1881, replaced by a new dam upstream in 1914, and supplemented in 1933 with Prettyboy Reservoir.

Keeping the ports of the United States navigable and its multitude of municipal, irrigation, industrial, and other reservoirs productive of their essential water supplies is a continuing operation. In 1960, dredging activities were in progress along the Atlantic and Gulf coasts from Maine to Texas, and in Pacific ports from Puget Sound to San Diego. For example, in the fiscal year ended June 30, 1960, a total of 74,160 cubic yards of silt was removed from the Penobscot River for maintenance of the harbor at Bangor, Maine; and sediment removal was carried on all along the Atlantic Ocean and Gulf of Mexico to Brownsville, Tex.

The same situation exists along the Pacific coast. During the last 5 years, the average annual maintenance cost for Puget Sound has been $125,000. During fiscal year 1960 in San Francisco Harbor, 763,000 cubic yards of sediment was removed from the main ship channel, at a cost of $177,660. To the same date, $2¾ million had been spent in maintenance of the Los Angeles and Long Beach harbors.

Almost any United States port could be added to the examples of the costly effects of sedimentation resulting from watershed erosion. The continuing century-and-more-old challenge of reducing the amount of sediment reaching our streams, reservoirs, lakes, harbors, and estuaries thus clearly is demonstrated to be intimately interrelated with soil erosion control and agricultural water management.

Old Farm Stays Proudly On

In Megalopolis' Path

By David A. Bennett

IN 1696 one Samuel Emerson bought 15 acres of land north of Frenchmen's Creek on the Bellamy River at Dover in New Hampshire for 30 pounds and 5 shillings. In the more than 250 years since then, use of this and surrounding land has undergone many changes. The farm, enlarged since Samuel Emerson bought it, now is struggling to stay out of the megalopolis that's engulfing the area, in which the U.S. Department of Agriculture has helped landowners in their farming operations for the past 30 years.

From records of the old place at Dover, the G. Allen Huggins, present owners, tell an interesting story of the various uses that have been made of the land down the years. Early-day crop production "records" can still be seen where they were jotted down on the exposed, hand-hewn rafters in the attic of the homestead, built between 1690 and 1700. They include notations such as "29 bu. barley 1820," "100 lbs. flax 1818," "25 bu. barley and 6½ bu. flaxseed 1821," and "13 sheep 1808."

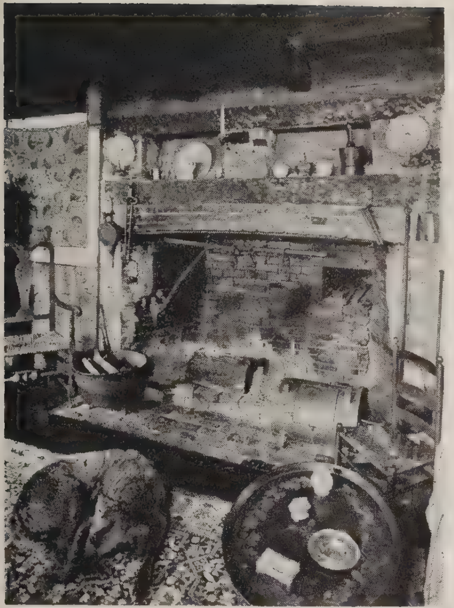
Note:—The author is soil conservation aid, Soil Conservation Service, Rochester, N. H.

A hogshead used for measuring barley still is in the attic. Flax wheels, spinning wheels, a loom, and other early weaving tools make the attic a paradise of antiques.

The farm was enlarged in 1700. Flax and barley were the main crops until about 1880, about the time one Mark Chase bought the farm, for $10,000. Dairy farming was the main source of income from then until 1918, when Ralph Towle took over ownership and promptly made a $12,000 harvest cut of standing timber.

The Huggins bought the property in 1929. Mrs. Huggins, an outdoors woman with a green thumb, operated the farm herself through World War II, as her husband, a banking consultant in

Wildlife finds a haven on Huggins farm around this 260-year-old wood shingled house.



The fireplace still is used for cooking.

a 3-State area, was away much of the time.

In 1948 she became a cooperator with the Strafford County Soil Conservation District, and received help from the Soil Conservation Service in preparing a coordinated soil and water conservation plan for the entire farm, now increased to 141 acres.

Wildlife and woodland conservation are the central part of the plan. As Mrs. Huggins had to cut down on her farming operations, part of the land now is leased to a neighboring dairy farmer. Wildlife is benefited by a farm pond and 1,400 feet of multiflora rose hedge. Meantime, the land is going back into forest, its original condition, for use of wildlife.

Besides taking care of the existing woodland, Mrs. Huggins plans to plant trees on a 30-acre field that is too wet for other crops. The trees, she points out, will provide additional cover for more wildlife. Another pond also is planned for the benefit of wildlife, and for its recreational value. Geese fly in from the nearby saltwater bays to rest and feed. In one field is a knoll that usually is clear of snow. Once, as ice covered the bays, 30 hungry and weak geese took refuge on the knoll Seeing their condition, Mrs. Huggins notified the local game conservation officer, who fed them corn until they could take care of themselves again.

The Richmond-to-Boston megalopolis is closing in on this farming area; but the Huggins find a rewarding life in their colonial home, which remains much the same as it was a century and a half ago, with its open fireplaces in each room, dutch oven for baking, and original furnishings.

REVIEW

LAND OF PLENTY THE AMERICAN FARM STORY. By Wheeler McMiller. 138 pp. 1961. Holt, Rinehart and Winston. New York. $3.95.

Wheeler McMillen has drawn upon a lifetime background as a reporter of agricultural progress in telling the success story of American farmers' efficient production. It is a story of how they, 9 percent of our population, now produce more than enough for present needs.

Land of Plenty is an interesting and informative account of technical and scientific changes in farm machinery, crops, control of insects and diseases, agricultural education and research, and farm cooperatives.

The author interprets the Nation's agricultural productivity, not just in terms of the country's fertile soil and favorable climate, but as a product of the American freedoms and institutions that started with the pioneer one-room schools and include the 100-year-old Department of Agriculture and Land-Grant Colleges that have developed agricultural science and technology into conventional working tools for farm families.

The book is written from the agrarian viewpoint that dominated America through Mr. McMillen's generation. He manages well to convey to the reader the "feel" of our national heritage—a respect for hard work that has given dignity to American farmers. Making the point that, to the present, it has been as much of a challenge to capable young men to become agricultural scientists as to be rocket scientists, he makes it clear that we do not dare to lose that emphasis.

The book also draws the clear conclusion—one that is easily overlooked by today's urban-oriented society—that our great industrial economy would not have been possible without benefit of our agricultural productivity.

The author pays special tribute to the late H. H. Bennett for his outstanding contributions in awakening the Nation to a realization of how truly precious topsoil is, how fast it was being lost, and how all mankind must forever be dependent for food on a few inches of topsoil. He describes how Dr. Bennett's efforts resulted in the nationwide soil and water conservation program now carried on by farmers in local soil conservation districts.

—Gladwin Young

Have You Seen? - - - -

• The new *Great Plains Journal*, published semiannually in Lawton, Okla., by the Great Plains Historical Association. It is devoted to that region's history, environment, agriculture, conservation, and other subjects, and includes in the first issue an article on "Conservation in the Future of the Great Plains," by SCS Administrator Donald A. Williams.

• "Waterweed Control on Farms and Ranches," by Verne E. Davison, John M. Lawrence, and Lawrence V. Compton, published as USDA Farmers' Bulletin 2181. It describes in detail the types of

waterweeds; the problems they present in fishponds, irrigation reservoirs, and ditches; their prevention; and their control by fertilization or use of chemicals.

THE NEXT 25 YEARS

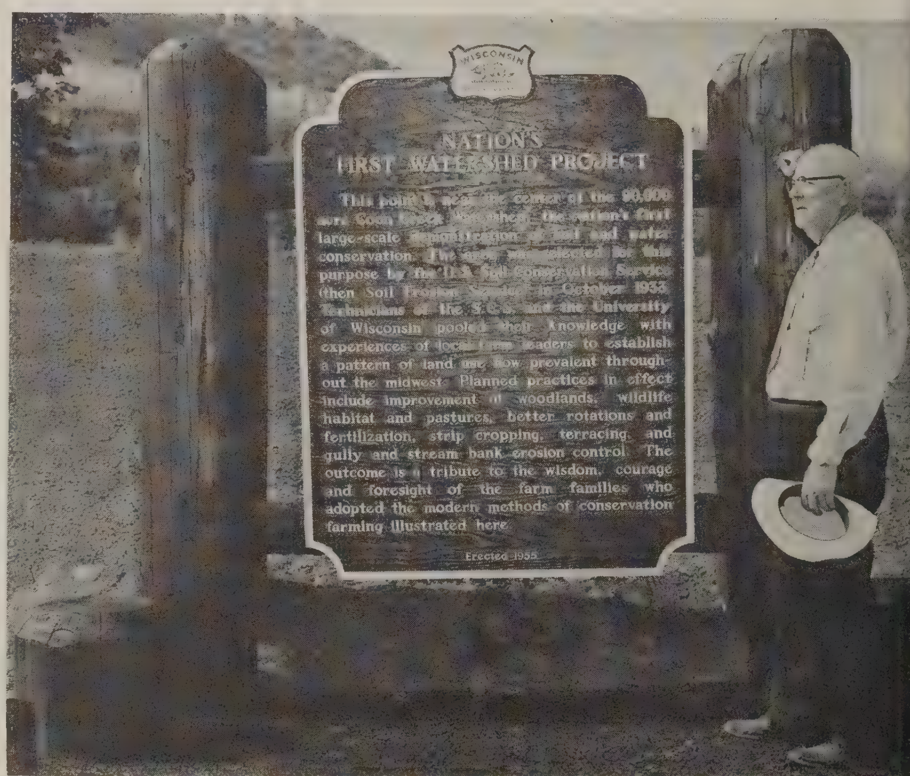
"As people look more carefully at their land and water, parks and timber, wildlife and shorelines, there will be a better, broader understanding of how all these resources are related, and fit together. More people will learn, for example, that what happens to the land and timber upstream, affects the water supply downstream. More people will learn, too, that all sections do not have enough resources of all kinds for all purposes. The need for planning will become more evident; the chance of controversy over priorities of use will increase.

"With 25 years of increasingly broad experience in resource planning and programs—and with a direct assignment by the States to act constructively in their field—districts can anticipate a period of added responsibilities and greater pressure. No other existing instrument of government has a greater potential for representing effectively the resource needs and desires of entire communities.

"Districts developed primarily for the conservation of soil and water—and for the benefit of agriculture. Now many districts are being called on to help with other resources, and give increased attention to the needs of their urban and suburban residents. Districts can serve more people; more resources. The clear challenge of the next 25 years, then, is the challenge of wider, greater service."

—From program of twenty-fifth anniversary dinner for soil conservation districts, sponsored by the Natural Resources Council of America, Washington, D. C., March 19, 1962.

Conservation History Marches On



It was a proud day for the late Dr. Hugh Hammond Bennett when he posed in 1955 beside this marker proclaiming the site of the first watershed project in the United States, established in 1933—nearly a quarter of a century before.

JULY 1962

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

Soil Conservation
25 Years Ago

"The cultivator who possesses the art of good cultivation together with a knowledge of the facts demonstrated by soil scientists is the real soil builder. He recognizes the fertile soil as a living complex and not an inert mass; the boundary between death or decay of one generation of plants in the soil and the life of another springing out of it, is very narrow. He strives to maintain and, if possible, to increase the vitality of the soil of which he has charge."

•

"In planning for research and establishing erosion-control works, South Africa has recognized the similarity between environment in that country and in sections of the Great Plains of the United States and has utilized the results of our experience. Similarly, their experience may serve as a check on our procedure, suggest other methods for erosion control, and indicate new lines of research."

VOL. XXVII, NO. 12 JULY 1962

CONTENTS

COVER PICTURE—All over the country school youngsters like these visiting the Guerdon Reed, Jr., farm in Grant County, Wis., are taken by their teachers to learn about conservation farming first hand. (Photo by E. W. Cole.)

Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

SOIL CONSERVATION is the official organ of the Soil Conservation Service, published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication was approved by the Bureau of the Budget, June 26, 1958.

FRANK B. HARPER, Editor

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Conservation Education

In the Classroom and Afield

By Donald A. Williams

RESPONSIBILITY for soil and water and related resource conservation bears more heavily on every succeeding generation as our population mounts, and our land and water problems multiply. Thus it is the sober obligation of the current generation to prepare the next so well that it will discharge its conservation responsibilities more wisely and effectively than any of its predecessors.

That means instilling in today's young people a basic understanding of what these life-supporting resources are, a true appreciation of their real values, and some practical knowledge of conservation principles and actions.

The first step is to teach conservation in the Nation's classrooms, from kindergarten through college. Incorporating conservation subjects in the school curriculum at any level is appropriate; for soil, water, plant, and wildlife conservation is part and parcel of conventional subjects such as elementary science, biology, nature study, geography, health and nutrition, and other sciences and social studies.

To confine teaching an ''agricultural'' subject such as soil and water conservation to rural areas no longer suffices. The conservation and wise use of these and allied natural resources affects every one of our 186 million people —from the farmer and rancher who produces our food and fiber crops to the youngest city consumer of milk from his nursing bottle. It equally concerns the fast-growing ranks of rurban and other land users and city people who must have ample water for household, industrial, and recreational uses.

Fortunately for the soil and water conservation movement, resource use and conservation has come to be recognized in its proper perspective by thousands of teachers and other educators. For they, more than anyone else, will shape the attitudes of tomorrow's generations toward the renewable natural resources by which we live. Many science and social studies teachers and others have found they can strengthen the subject content of their courses by relating them to local resources, their use, and conservation. Many more should do so if our ever-improving conservation technologies are to be applied to the fullest needed extent.

Conservation education has made great forward strides. There is increasing conservation preparation in teacher training colleges. More than 100 conservation workshops are held each summer for teachers. A growing variety of classroom texts and other materials on natural resources and conservation are becoming available to teachers and students.

About 20 colleges and universities now offer undergraduate degrees with soil and water conservation majors. Thirty-one States have conservation advisory committees or councils, on which State departments of education, colleges, and universities usually are represented.

Formal resource education in schools also is supplemented substantially by educational activities of the Federal-State Extension Services, Forest Service, and by conservation programs in school-age youth organizations such as the Boy and Girl Scouts, Camp Fire Girls, Junior Audubon Clubs, Future Farmers of America, and 4-H Clubs. These major youth groups alone include more than 11 million boys and girls from farms and cities, plus several million dedicated adult leaders.

The Soil Conservation Service provides information on soil and water conservation to all of these educational interests and youth groups, and to textbook writers and producers of other educational materials. It also similarly serves organizations such as the Conservation Education Association, National Science Teachers Association, American Association of School Administrators, Joint Council on Economic Education, American Nature Study Society, and the National Association of Biology Teachers. It works with specialists of the U. S. Office of Education on conservation teaching materials.

The SCS is not in the teaching business, any more than it is in the farming business; but, just as providing technical help to land users is our responsibility, so is providing aid to conservation education our responsibility. This assistance ranges from supplying teachers with requested basic conservation information to participating in field tours for school and youth groups.

The Soil Conservation Service holds conservation education to be of highest importance, for only a conservation-minded people can safeguard and improve our remaining heritage of renewable natural resources in the future.

Robert R. Finlay.

Teaching Teachers To Teach

Resource Conservation

By Raymond S. Brown

RESOURCE conservation education in Ohio has made pace-setting studies during the last decade because of a successful program of teaching elementary and high school teachers how to teach this live subject.

It was in 1952 that the State Department of Education added a supervisor of conservation education to its staff—the first such full-time position in the entire country. Today, a half-dozen or fewer States yet have a counterpart to the Ohio position, occupied from the outset by native born Ohioan, and Ontario outland-reared Bob Finlay. In the intervening 10 years, he has worked with more than 11,000 Ohio teachers—through outdoor workshops, meetings, and personal visits. His office now mails out about a quarter of a million pieces of resource conservation teaching material a year.

"Get resource education into the State's schools any way you can," was Finlay's assignment. He began by working out educational projects for teachers with the aid of information supplied by local Soil Conservation Service technicians, county Extension agents, game protectors, and school board members.

Finlay has found the county outdoor workshop to be the most effective device he has used with "at least 80 percent of the teachers" agreeing with him. He plans these outdoor workshops around whatever is important in the part of the State involved. It usually is soil and water conservation on farms; but it may be strip mining, a watershed project, or rurbanization. When a workshop is held on a farm, Finlay tries to pick one that has a good soil and water conservation program, a pond developed for wildlife and recreation, and other effective and up-to-date measures.

Outdoor workshops usually include key points such as watershed dams, terraces, waterways, woodland-improvement areas, and wildlife developments. The time-tested "hayfield limousine"—a hay rack with bales of hay for seats—takes the teachers from stop to stop. A technician is on hand to explain the problem and its solution.

"The teachers learn the practical economic implications of conservation, facts often omitted from textbooks," Finlay says. "Their first reaction to strip mining was that it should be forbidden. They were quick to modify this view when they learned how jobs, business, even schools would be affected."

Not all teacher workshops are held outdoors. In some counties, the teachers hold an annual all-day institute devoted to conservation of natural resources. One held last fall under the cosponsorship of the Summit Soil Conservation District and the Summit County Teachers Association is typical.

The feature event was an address

Soil and water conservation farming like this is Finlay's favorite teachers' outdoor workshop subject.

Note:—The author is State conservationist, Soil Conservation Service, Columbus, Ohio.

Finlay explains tree growth to teachers during outdoor workshop.

by Dr. Roscoe H. Eckleberry, retired editor and professor of education at Ohio State University, and a member of the Ohio Conservation Laboratory staff for more than 20 years. Some 1,000 elementary and high school teachers also studied exhibits on conservation and displays of teaching materials. Many brought displays from their own schools.

What help do teachers want most in teaching conservation education? Finlay called a group of school administrators together and came up with this answer. Charts of basic concepts, lesson outlines to follow, and visual aids. In a project to produce such materials, teams composed of one technician and one educator worked on various subjects. The Ohio Forestry Association obtained a grant from a group of Ohio utilities to finance the project. The Natural Resources Institute of Ohio State University supported the project and helped prepare the materials. SCS and Forest Service technicians served on the teams.

These teaching aids began to roll off the production line in 1958. During that year Finlay's office mailed 11,000 charts to Ohio's teachers. ''A Guide to Teaching Conservation in Ohio's Elementary Schools'' came next—10,000 copies went to the teachers in 1960. This comprehensive booklet has become the ''conservation teacher's Bible.'' In 1962, about 500 sets of film strips with notes in guidebook form will be distributed.

Finlay also is a product of Glen Helen outdoor conservation laboratory at Antioch College near Xenia, world famous outdoor classroom that will be the site of the Ohio Conservation Laboratory in 1963. Finlay is assistant to Carl S. Johnson, director of the Ohio Conservation Laboratory and associate professor of conservation at Ohio State University.

Finlay received the 1961 ''Professional Excellence Award'' from the All-Ohio Chapter of the Soil Conservation Society of America.

''The most pressing need,'' Finlay says of what's ahead in conservation education, ''is to get conservation courses in the colleges. We've got to sell more professors on conservation. We've got to train more teachers in conservation. It should be considered as fundamental as the teaching of English.''

Star Farmer of America

Schooled in Conservation

By Leon J. Sisk

MEET James Isaac Messler—1961 Star Farmer of America and Conservationist.

Before he was 20, the tall, blond farm youth, who lives near Greenback, Tenn., had parlayed his original ''grubstake'' of a calf given him by his grandfather when he was only 5 years old to a 45-cow herd of registered Holsteins, bought and paid for a 193-acre farm, and boosted his net worth deep into the 5-figure column.

His Star Farmer award was won in competition with 400,000 others in the 50 States and Puerto Rico. A member of his high school soil judging and dairy judging teams, James Isaac went on to pile up more conservation and other awards, such as the 1957 State dairy award, 1958 Star Farmer in Tennessee, and in 1959 the FFA-SCD State soil and water conservation management award.

How has this young man accumulated in a few years more than most farmers do in a lifetime? A burning desire to be a farmer; the good example set by his father, C. L. Messler; the inspiration of his vo-ag instructor, Bruce Hinton; the encouragement and help of the

Young Messler plans for the future of his farm.

Note:—The author is field information specialist, Soil Conservation Service, Spartanburg, S. C.

Soil Conservation Service technicians—all have been factors in young Messler's successful career. That is to say nothing of the fact that he worked for a time with the SCS as an aid.

Conservation education has undoubtedly been an important factor in James Isaac's starred career. For him, farming was always more fascinating than football, and cows and conservation of more interest than hot rods and the other teenager activities.

Like father, like son, could be another reason for his success. His father is highly respected in the community for his progressive farming methods. He owns a productive 200-acre farm, and has been a district supervisor ever since the Loudon County Soil Conservation District was established in 1956.

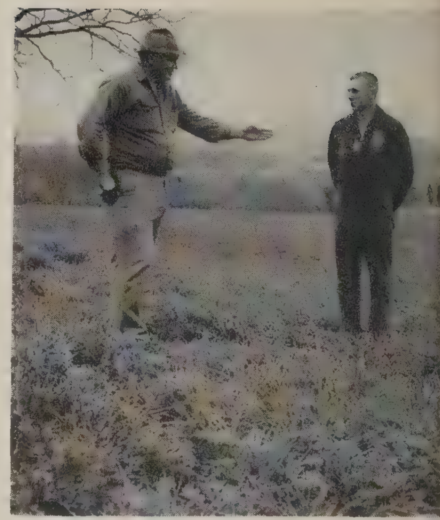
And because James Isaac respects his father's leadership in conservation, one of the first things he did when he bought his farm in 1959 was to get his vo-ag teacher and the SCS to help him develop a conservation plan for it. The farm was strictly a "rabbit farm." The land was hilly and rocky, eroded easily, and was badly gullied and rundown. It had been overcropped, planted to corn every year, and was in "bad shape," in the words of the local SCS technician.

But walk over it today, and you'll see contour stripcropping, grassed waterways, young pines growing on rough, gullied areas, permanent pastures, alfalfa for hay, rotation cropland, and a farm pond for livestock water and fishing.

The United States' 1961 Star Farmer has a diversified farming operation, with major emphasis on dairying. His 35 milkers produce an annual average of 11,100 pounds of milk and 425 pounds of butterfat, as compared to the State average of about 8,000 pounds of milk. He also finishes out about 100 feeder pigs a year.

Young Messler paid less than \$14,000 for the farm. The county tax assessors recently re-appraised it at \$21,000. In March 1962, he bought another 50 acres to bring his total acreage up to 243. He also owns the up-to-date farming and milking equipment needed in his operations.

James Isaac has on his own initiative put to use a lot of ideas he picked up while working with the SCS. His vo-ag instructor gives this experience much credit for the conservation improvements young Messler has made on the farm, though in his senior year in vo-ag he majored in the study of soil and water conservation. That was when he got the SCS job, because, as he says, "I thought I could learn something I could use."



James Isaac's father suggests a site for his future home.

Star Farmer with prize herd of high-producing Holsteins.

"James Isaac was the most curious and industrious aid I've ever had," SCS Work Unit Conservationist Thelbert Hicks recalls. "He helped with engineering surveys of farm ponds, drainage ditches, contour stripcropping, terraces, contour lines, and grassed waterways. He also helped to supervise the construction of these and other practices. And when he didn't have fieldwork to do, he was working with aerial photographs, or coloring soil and capability maps. He was dead set that he was going to learn everything he could about soil and water conservation."

It all has paid off for Star Conservation farmer James Isaac Messler.

◆

Dr. George Blume of Virginia Polytechnic Institute reports that Virginia in 1960 was officially classified as more urban than rural, with 56 percent of its citizens in the urban grouping.

2,000 North Dakota Teachers Study Conservation

By Charles A. Evans

THIS is the 11th anniversary of North Dakota's State Conservation Training Center at the Ritchie Memorial Camp on the shore of Lake Ashtabula near Valley City. More than 2,000 teachers have studied at the Center.

Beginning with two 1-week sessions in 1952, the Center now operates summerlong. Seven weeks are devoted to the presentation of five college-credit courses. Three of these courses are on the use and conservation of natural resources: Soil, water, and minerals; plants and conservation; and wildlife conservation and management. The teachers may take the courses in one full summer session or, as many do, one unit each summer for several years. In addition, two courses of 2 weeks each in art and science for elementary teachers are offered. All courses at the Center are supplemented with out-of-door study and experiences to increase teacher efficiency in using local environments for their teaching purposes.

At other times, the facilities are used for conferences of groups interested in conservation, like the North Dakota Association of Soil Conservation Districts, ministerial associations, and college faculties.

The idea for the Center grew out of the practice, begun in 1949 by Marvin A. Leraas, of holding summer conservation biology courses in the camp at Lake Ashtabula. Leraas, professor of biology at the North Dakota State Teachers College in Valley City, has been director of the Center since it started.

Teachers measure a slope with a yardstick, spirit level, and board.

Possibilities for teaching conservation in an outdoor environment and its appeal to teachers soon became apparent. Financial help to lease an area of lakeshore land and improve the site came from North Dakota soil conservation districts and the North Dakota Wildlife Federation. Supervisors of the Barnes County Soil Conservation District leased the area, and serve as the managing board for the camp. More financial help came later from the State Game and Fish Department, the State Soil Conservation Committee, and the North Dakota Legislature.

Other agencies help with program planning, laboratory, and field instruction. They include colleges, the Soil Conservation Service, Bureau of Reclamation, Fish and Wildlife Service, and State agencies such as the Geological Survey, Water Conservation Commission, Extension Service, and Game and Fish Department.

Beginning with tents and campfires, the Conservation Center now has nine buildings and numerous recreational facilities.

North Dakota Conservation Training Center is in a setting of the subjects of its conservation courses.

Note:—The author is assistant State conservationist, Soil Conservation Service, Bismarck, N. Dak.

10 Million Young Conservationists

By Shirley Miller

"CONSERVATION is what we eat and what we wear and where we live, and if we don't, we won't."

This classic definition of conservation was written by a 9-year-old from New Hampshire in one of the up to 300 letters at a time received by the Audubon Junior Department of the National Audubon Society from young conservationists from coast to coast. He is one of more than 10 million youngsters, who in the half a century since 1910, through their affiliation with the Audubon Junior Program, have discovered the importance of our soil and water, our plants and wildlife. Many leading conservationists today may date their active interest in this subject to membership in an Audubon Junior Club.

From their multiplying ranks and growing enthusiasm, it seems apparent that conservation today is absorbing the interest of a large segment of our younger generation. Each year, the number of groups subscribing for this program tops the preceding year's figure. Enrollment for the 1961-62 year exceeded that of 1960-61 by 54 percent.

The materials provided by the Audubon Junior Program stress the relationship of all life on this planet, and establish a focal point for a wide variety of conservation learnings. They lay a solid foundation for more advanced scientific study in many fields. They also help a child gain a better understanding of himself—of his skills and abilities—and call attention to his responsibilities as a citizen of his country. Most important of all, they arouse appreciation of the beauty and value of the world we live in and encourage a desire to protect and conserve these values.

Conservation scrapbooks fascinate pupils in Dawson County, Nebr., Middle No. 29 School.

An example of the learnings children gain about soil conservation received recently at Audubon House was a jumbo-sized scrapbook entitled "Our Conservation Book." It was produced by the third-grade Audubon Junior Club in the Barge-Lincoln School, Yakima, Wash. In it these children had combined a term-long study of soil and water conservation with other subjects. Each of the 35 8-year-olds had contributed an illustrated essay, covering such subjects as "What Makes Soil," "How Soil and Water Help," "What Soil Needs For Growing Crops," "How Soil Is Made and Used," and "We Need Soil and Water."

Each year this program emphasizes one specific topic as a focal point for conservation and natural science learnings, such as trees, birds, insects, soil and water, mammals, and flowers. However, each topic stresses the relationship of that subject to the world around it. Conservation concepts are achieved by a host of creative projects and

Barge-Lincoln School third graders are proud of plants they grew.

Note:—The author is director, Audubon Junior Program, National Audubon Society, New York, N. Y.

Children get close to Nature at Minnesota Braille and Sight-Saving School.

Irrigation farming in the Yakima Valley.

activities that are documented in detail. Materials for this topic are available at the opening of the school year.

Each child in an Audubon Junior Club—a group of 10 or more children plus their leader—receives a book, illustrated in color, on the specific topic of the year. He also receives a colored pin, certifying that he is a Junior Member of the National Audubon Society.

The conservation and natural science materials the Audubon Junior Program provides are easily integrated with all areas of the elementary school curriculum. In addition, each year thousands of Scout troops, Camp Fire Girls, 4-H Clubs, religious youth groups, and summer camps use these materials to implement their own conservation and nature programs. There also are hundreds of neighborhood Audubon Junior Clubs that flourish in their own right.

One of the most active groups in the country is comprised of children in the Minnesota Braille and Sight-Saving School in Faribault, Minn. For more than a decade, Mrs. Charles MacKenzie has used the Audubon Junior Program as a basis for her inspired conservation and nature teachings with these blind children. They know birds by their songs and calls, trees by touch, flowers by odor. They can analyze quickly a handful of soil by the "feel."

So it is that from Illinois, California, and Texas, from Puget Sound to Chesapeake Bay, young conservationists are in the making the Audubon Junior Program way.

Teacher Conservation Institutes

Bring County People Together

By David O. Davis

IF you look for reasons for the spread of soil and water conservation teaching in Nebraska schools you're sure to give a large measure of credit to the County Teacher Conservation Institutes.

More than 2,200 teachers have attended the 53 summer institutes held during the last 4 years, including 11 in 1961. An institute runs 2 days. Arrangements are made jointly by the county school superintendent and soil and water conservation district supervisors.

Institutes are held in three adjoining counties at the same time. A team of speakers on various phases of soil and water conservation works in three rotating units. District supervisors take turns as chairmen. Field trips are made the final afternoon.

County people taking part in the programs include, besides the farmers and teachers, bankers, merchants, and personnel of the Soil Conservation Service and other State and Federal agencies headquartered there. They give the teachers the details of the conservation job going on in their own county. Their participation gives local focus to the broad picture presented by the traveling team. It also provides time for the traveling units to move from one county to another—especially between the first-day morning and afternoon sessions.

Note:—The author is field information specialist, Soil Conservation Service, Denver, Colo.

The idea of the institutes hatched in a meeting called in January 1958 by Warren Fairchild, executive secretary of the Nebraska Soil and Water Conservation Commission. Present were representatives of the State Department of Education, State Normal Board, Agricultural Extension Service; the Game, Forestation and Parks Commission, Forest Service, Doane College, and the Nebraska Association of Soil and Water Conservation Districts.

This group saw in the institute idea a way to give teachers an understanding of the problems and action involved in this conservation movement, as well as information for the teachers needed to create a desire among children for conservation instruction.

The Nuckolls County school superintendent held the first conservation institute in 1958. At the past rate of the institutes' spread, one will have been held in every Nebraska county by the end of 1963. Then they start over with a followup program. Among conservation leaders prominently identified with this outstanding teacher training method has been Miss Ivah Green, formerly professor of education at Doane College, a longtime director of conservation workshops, and author of articles and teaching aids on the subject.

Institutes can best be held only during the 20 days between the end of summer school and the beginning of the fall term. The schedule of the traveling speaker team accordingly is extraordinarily tight. Its average is 18 counties a year.

"Conservation Teaching Methods" exhibits studied at a County Teacher Conservation Institute.

Topics for the traveling speaker team this past year were: Importance of conservation, soil conservation demonstrations, woodland management, wildlife management, water, conservation teaching methods, and how to integrate soil and water conservation teaching in the school.

Topics offered by local people vary. For example, the Scottsbluff County Institute included conservation needs, the Gering Valley watershed protection project, and accomplishing conservation goals.

Fairchild estimates that the teachers attending the institutes have passed their gleanings on conservation to at least 11,000 families.

"I always thought conservation to be a dull dry subject," one teacher remarked. "You have made it seem gay, and fun."

Another said: "With all the help and encouragement I've received here, I know I'll be able to teach conservation and make it stick in my pupils' minds."

A county sueprintendent observed: "Conservation has been studied for years in our schools, but at this institute many practical things were provided which can be taken home and used." Another reported after an institute was held in his county that "As I visit schools I find the teachers are doing a fine job of weaving conservation into our course of study."

◆

Teach our children to love and protect the soil—and you've invested in soil conservation for the future.

Teachers see for themselves what floodwater can do to a road and bridge.

“We Pledge Ourselves”

By John C. Beard

SUPERVISORS of the Southmost Soil Conservation District in the Lower Rio Grande Valley of Texas consider their work with schools a most important part of their responsibility of using every practical means of encouraging a total conservation program.

Teaching conservation in the public schools is the No. 1 item in a pledge appearing on all of the printed programs for district-sponsored activities—to accent their responsibilities. The pledge:

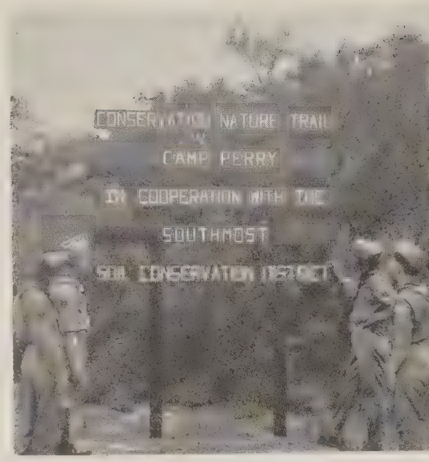
‘‘We pledge our time and energy to the strengthening of a complete conservation program by (1) recommending and urging that conservation be taught in our public schools as a planned part of the curriculum, by (2) making sure that an active and continuous research program is conducted to solve the soil and water conservation problems in our district, and by (3) assisting in the ready application of proven, new or improved, techniques for getting the conservation job done on the land.’’

Note:—The author is work unit conservationist, Soil Conservation Service, San Benito, Tex.

With a major emphasis on their work with the schools, the idea of ‘‘Teach Our Youth What Is Right With Conservation’’ has been accelerated. The supervisors know that many times the lessons of conservation teaching that the parents otherwise would not hear reach the ears of adults from the mouths of children.

Teaching conservation in the schools has been approached in several ways. The most successful methods from the district supervisors’ standpoint have been field trips, along with essay and poster contests to supplement classroom teaching in stimulating parents’ and community interest. During the 1960-61 school year alone, more than 300 5th grade students from 6 different schools took the district conservation tour. The supervisors themselves conducted these tours.

More schools are becoming interested in these activities each year. Related district activities include work with Boy Scouts, and field days held for farmers. The application of conservation practices in the district has increased steadily, indicating the supervisors’ educational efforts are paying off.



Entrance to conservation nature trail at Boy Scouts of America summer camp.

Between 1959 and 1961, the district won five State awards and several regional awards. The top prize for all districts in Texas was won by the Southmost district in 1960, when the supervisors furnished the leadership that won the title ‘‘Outstanding District’’ in the Fort Worth Press Conservation Awards Program.

◆

Land-Grant institutions, although numbering fewer than 4 percent of the Nation’s colleges, enroll about 20 percent of all U. S. undergraduate students and grant nearly 40 percent of all doctoral degrees.

◆

USDA’s Agricultural Research Service Western Utilization Research and Development Division at Albany, Calif., has developed a whole-grain, 84-calorie wheat wafer as a compact, long-keeping emergency ration for stockpiling in fallout shelters. The wafer with an estimated shelf life of 5 years or longer is made from whole grain that has been parboiled, dried, puffed, crumbled, and made into a wafer of average cookie size.

A typical soil and water conservation tour by school pupils.

Ted S. Pettit.

Boy Scout Nature Muse

By T

ANYONE driving past the National Headquarters of the Boy Scouts of America in North Brunswick, N. J., on a sunny Sunday should be advised that the cars jamming the parking lot belong to visitors who have come to see the newly opened Outdoor Nature-Conservation Museum and the nearby Johnston Historical Scouting Museum.

After more than 4 years of planning and construction the outdoor demonstration areas are now open to the public. Cub packs, Boy Scout troops, Girl Scout units, family groups, and other conservation-minded visitors come in droves each weekend to study the more than 100 exhibits, displays, and on-the-ground demonstrations that depict Nature in action and what good conservation means.

The Outdoor Nature-Conservation Museum is designed to accomplish two purposes: One is to interpret the ecology of more or less typical wet, eastern hardwood forest in terms that anyone can understand. The other is to create an awareness of the importance of all natural resources, both to people as individuals and to the welfare of our country and our standard of living in a democracy. There are several hoped-for goals. It is hoped that the visitors will see that each phase of the world of Nature—geology, climate, soil, water, plants, wild animals, and man—is interesting and important in itself, but that, at the same time, all are closely interrelated.

To accomplish these purposes, the 60-acre area has been divided into two sections. Visitors first walk around a half mile gravel trail through typical eastern hardwoods. There are signs that identify the major plants that grow there naturally. These signs also point up the place of each plant in the total. Other signs point out such things as evidences of past land use and geological, physiological, and climatic features, and their influence on the forest. Still other trailside signs point to animal dens, nests or burrows, and other evidence of the existing wild animal populations.

Along this trail, too, are six clearings, each containing a number of panel displays, many in three dimension, and other kinds of exhibits—all designed to explain simply and clearly the dynamics of Nature and their interrelationships. Thus, the geology area explains such features as the origin of the earth, how rocks are formed, and the geologic history of New Jersey. Most displays are natural rock and mineral samples.

In the same way, the weather-climate area explains weather and climate and their relation to the world of Nature and man's activities on earth. Some of these displays are changed so that hurri-

Note:—The author is director of conservation of Boy Scouts of America, New Brunswick, N.J.

SCS display tells how Mother Nature makes soil.

Outdoor Conservation Classroom

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canes, thunderstorms, blizzards, or droughts are explained in their appropriate seasons.

The soil area covers such subjects as man's dependence on soil, soil properties and charactertistics, how soil is formed, the soils of New Jersey, and different soil formations from four parts of the United States. Among the water exhibits installed to date are a large panel on the hydrologic cycle, a well to show what ''water table'' means, and working models showing evaporation, transpiration, infiltration, and runoff. The plant and animal areas are similar in approach.

The purpose of all of these demonstrations is to point up Nature in action—the basic ecology of the area. The use by man of these resources is the subject of the second section of this 60-acre plot.

Thus in a conservation demonstration area covering some 10 acres, several examples of good land use have been established. There is a ⅓-acre farm pond, stocked with bass and bluegills. In the fall and spring, wild mallards, black ducks, geese, and other waterfowl use it daily. A pair of mallards nested there in 1961. Nearby large aquaria provide a closeup view of fishes of the State, turtles, frogs, and other aquatic life.

Also near the pond are three wildlife food plots, and a number of brush-piles that provide food and cover for rabbits, quail, pheasants, and songbirds. Multiflora hedge rows, wildlife food and cover shrubs, a model 1-acre pine plantation, and a grassed waterway have been planted.

Along the sides of a ¼-acre manmade slope, are runoff plots to show the beneficial effects of contour planting, crop strips, and sod cover, as compared with up-and-downhill cultivation with no soil protection. A catch basin at the bottom provides a dramatic comparison of runoff and soil loss under various practices. At the exit of the conservation area is a watershed model which explains not only a watershed as a unit for conservation planning, but also various other good land-use practices that cannot yet be demonstrated on the museum grounds.

Along the trail and around the conservation area are other features of interest to the visitors, including bird houses and feeders. In time, concrete casts of animal tracks—from dinosaur to man, but all native to New Jersey—will serve as trail markers to guide the visitor on his 2-hour tour to see for himself how Nature works and what good conservation means.

The technical or financial contributions of various local and national and State agencies and private interests have made the Outdoor Nature-Conservation Museum possible. They include, for example, the Freehold Soil Conservation District; the Soil Conservation Service, Rutgers University, the New Jersey Department of Conservation; industry and interested individuals; the Forest Service, the Weather Bureau, the Bureau of Land Management, the Geological Survey, the Fish and Wildlife Service, the Sport Fishing Institute, and a large farm equipment manufacturer.

Situated as it is, within an hour and a half drive of a population exceeding 11 million, this project has a tremendous potential as a means of educating large numbers of metropolitan and suburban residents in some of the basics of conservation and natural history.

Conservation Director Pettit and Scouts study farm pond at BSA national headquarters.

Milwaukee Schools Go All Out For Conservation Teaching

By Marvin Schweers

A COMPLETE revamping of the course of study in the Milwaukee public schools to include everything from A(ir) to Z(oos) as they relate to conservation has taken place during the past decade. As a result, every school day 106,000 Milwaukee school children from kindergarten through high school are now exposed to some phase of conservation education.

Largely responsible for this changeover to give greater emphasis to conservation is Roy S. Swenson, supervisor of conservation, science, and outdoor education.

''One of the great social and economic challenges of our day,'' Swenson will tell you, ''is to awaken the public to the need for more intelligent use of our resources to serve an expanding population. This is especially significant in Milwaukee and the lakeshore area, where three-fifths of Wisconsin's people live.''

Although plans had been developing over the past decade, integrated instruction in science and conservation has been a fact in the Milwaukee public school course of study only since 1959. The program to focus more attention on conservation, Swenson explains, is built on a six-point base: (1) Research, to find out what the need is and how best to meet it; (2) classroom instruction in the several fields of conservation subject matter and at appropriate grade levels; (3) supplements to classroom instruction through outdoor experiences and television; (4) pre-service and in-service teacher training; (5) public relations, to keep teachers, students, parents, officials, and the community informed on the need and methods of meeting it;

Roy S. Swenson with a conservation education resource unit.

and (6) the materials of instruction or classroom equipment.

Subject-matter emphasis at specific levels through the elementary grades and high school avoids both duplication and omission. In the Milwaukee system, students have what Swenson calls ''exploratory experience'' in all units of science from kindergarten through the 12th grade. For example, one area of major emphasis is the earth. In the kindergarten and first 3 primary grades, pupils study soil, rocks, weather, and air; in the 4th grade, rocks and minerals; in the 6th grade, air; in the 7th grade, weather; in the 8th grade, water and soil; in the 9th grade, rocks and minerals, air, water, and weather; in the 10th grade, biology; in the 11th grade, chemistry; and in the 12th grade, physics.

Each of the 140 public schools in Milwaukee has new equipment that could make the science teacher

A typical Wisconsin conservation dairy farm.

Note:—The author is State conservationist, Soil Conservation Service, Madison, Wis.

of a few years ago green with envy —television and other visual aids, portable science demonstration desks, binoculars, planetaria, microprojectors, and microscopes, among others.

"The upsurge in interest in conservation is tremendous," Swenson finds. "Young people are reacting very favorably to the inclusion of more conservation in their course of study."

Citing a University of Illinois study showing that 8 out of 10 children in elementary grades listed science as their No. 1 school interest, he emphasizes that "we're trying to capitalize on and satisfy that interest," and points out that "many of the science units at the elementary level are the natural sciences and relate directly to conservation."

Under Swenson's guidance, the Milwaukee school system has helped in the development of an abandoned farm in Kettle Moraine State Park, near Palmyra, for use as an outdoor classroom. Wisconsin's geology and its relation to conservation and multiple land use are emphasized on trips to the farm. Obtained by the Milwaukee Board of School Directors in 1947, this 50-acre Milton C. Potter School Forest, which Swenson supervises, also serves as an outdoor laboratory for conservation education and nature study. Thirty-five acres include one of the few remaining stands of virgin timber in Milwaukee's metropolitan area. Swenson is directing a long-range reforestation program on the other 15 acres, formerly used for farming.

Each year, more than 5,000 elementary and secondary school pupils study Nature and learn about the importance of conservation of natural resources through organized field trips to the forest.

"Emphasis in teaching conservation must create an awareness for the need of an action program," Swenson says of conservation education. "Understanding the need for harmony between man and nature develops an attitude. Attitude in turn develops into a way of life—the goal of good conservation education. Educators share the responsibility to bring about this needed philosophy."

Conservation Teaching Geared To Everyday Community Life

By Arthur W. Emerson

TEACHING conservation in the high school of Canyon City and John Day is geared to actual life in this eastern Oregon community which is surrounded by farms and ranches and shadowed by towering mountains with their forests and wild game.

And that is the way it has been since L. J. "Pete" Baucum started conducting one ½ hour conservation class a week as an extra-curricular activity a decade ago. He visualized his students studying conservation as they lived their everyday lives, so that, as each topic of natural resource conservation came up in the classroom, it would fit into the daily doings of the community.

Pupils and other teachers immediately showed so much interest, back there in the early 1950's, that

Instructor Baucum and conservation class members study land leveling and pasture improvement on his farm.

Note:—The author is field information specialist, Soil Conservation Service, Berkeley, Calif.

In the classroom, he explains use of grasses for improved pastures.

the principal agreed to a 1-hour daily course, called ''Soil and Water Conservation,'' for Baucum to teach. The class is made up of junior and senior high school students, and 1-hour credit is granted for the course.

''It is desired to provide in our curriculum a course of study which will give to our students a greater knowledge of nature and the natural resources of Grant County and Oregon,'' Baucum says of the conservation course with seven units as its guide.

It is designed to develop an understanding of what Grant County's and Oregon's natural resources are; how they affect the economics of the area; good conservation practices in protecting these resources and making better use of them; how best to enjoy the natural resources; and how to assist agencies in the State in carrying out good conservation practices.

Soon after school opens in the fall, the hunting season is in full swing; so the ''natural way to teach'' understandably begins with Unit 1 on ''Wildlife Conservation and Management.''

Right here the pupils also start studying land use and management, in its original environment, integrated with a safety program, and how it all fits into their everyday living—good game management; good land cover; clean, clear, even-flowing water for home, farms, and livestock. Similarly in Unit II on ''Conservation of Game Birds,'' they learn how good land use and soil and water conservation practices improve game birds' environment.

Unit III on ''Forests and Their Management'' follows logically into the wintertime lumbering season. This unit includes the teaching of forest, soil, and water management, in addition to how to fight forest fires, tree identification and scaling, and forest insect damage and control.

The objective of Unit IV—''Conservation of Our Soil and Water'' —is to point out to the pupils the importance of both water and soil to everyday needs. They study soil maps obtained from the Soil Conservation Service, and farm and ranch conservation practices, power dams and their importance, irrigation water, and high mountain watersheds that supply water to cities and rural areas. The importance of conserving soil and water by the use of various erosion control and other conservation methods is emphasized. Baucum has a conservation program on his own farm.

In Unit V on ''Grass and Weeds: Identification and Their Values,'' the students learn 80 different weeds and grasses common to the area, and learn the best grasses for holding soil and water, while getting a better concept of the forage big game and domestic animals use.

Unit VI—''Fish Management'' likewise is comprehensive.

In the final Unit VII—''Conservation of Our Natural Beauty''—the class pays special attention to scenic and recreational resources and values.

Throughout the school year of classroom and field studies, all available teaching aids are used. Rural Life Sunday and Soil Stewardship Week are observed. Soil conservation district supervisors and Soil Conservation Service, Forest Service, and other agency representatives all give a helping hand to Conservation Teacher Baucum, who also devotes personal time helping in the countywide teacher conservation workshops. Both elementary and high school students get a look at soil and water conservation through their regular classes.

The Grant Soil Conservation District sponsors an annual conservation speech contest. Trees have been planted on the school grounds, and a woodland thinning and tree planting demonstration area is operated with the county interagency committee.

F. P. Doyle, the present Canyon City-John Day High School principal, has much to back up his belief that this course in soil and water conservation is unique and one of the best in Oregon.

Class gets instruction in tree planting and care.

Kids' Cartoons

Liven Conservation Interest

By James L. Woodard and Louis J. Dondero

BETTER DO SOME Fast reading

The first-place cartoon.

THE thrill of competition and the fun of drawing pictures are stimulating lively interest in conservation education in some Vermont schools.

Attention to soil and water conservation and resource use is not new to Vermont educators. "Conservation Adventures with Dick and Debbie," a picture book sponsored by the Vermont Association of Soil Conservation District Supervisors and business firms in cooperation with the Commissioner of Education, has been used widely by Vermont school teachers and children. In addition, the State Department of Education has provided teachers since 1957 with "Conserving Natural Resources in Vermont," a curriculum bulletin on conservation education for grades 1 to 12.

The new conservation cartoon project, launched under Bennington County Soil Conservation District sponsorship, resulted from growing interest in making better use of conservation picture booklets published by the Soil Conservation Society of America. Soil Conservation Service technicians working with the district suggested the 1962 conservation cartoon contest as a new twist in stimulating both student and community interest in the subject of soil and water conservation so important to all.

The idea caught on fast. Every local merchant who was asked to contribute did so with real interest. Some indicated they would like to make it an annual affair; and one heavy equipment company breathed real life into the idea with a donation of $100 to buy 2,000 copies of the Society's booklets.

Legwork for the contest was handled by a four-man committee made up of Albert Horst, Bennington County district supervisor, Banker George Jepson, and the authors.

More than 900 7th and 8th grade pupils in the 4 Bennington County school districts were given copies of 2 of the Society's booklets, "The Story of Land, Its Use and Misuse" and "The Wonder of Water." Mimeographed instructions and a set of simple rules were passed out to all teachers and students, and each classroom was provided with a poster showing 6 sample conservation cartoons by Felix Summers of SCS.

The contest ran for a month so teachers could fit the conservation theme into their other classroom activities. It ended on March 15. The award for each of the four district winners was a pen set on a marble base; and for the top county winner, a $25 U. S. Savings Bond in addition to the pen set. The three judges included Don Trachte of "Henry" comic strip fame.

One hundred and twenty-five cartoons were submitted from 9 7th and 8th grade classes in the county—considered by the contest committee as a good start for the first year. Irene Lalonde, a 7th grade student at the Sacred Heart School, Bennington, won first prize. The other three winners were

Note:—The authors are, respectively, conservation aid and soil scientist, Soil Conservation Service, Bennington, Vt.

Cartoon contest winners with SCD Supervisor Albert Horst, l. to r.: Nancy Lawson, Susan Pratt, Irene Lalonde, and Lisa Dillmann.

Nancy Lawson, Bennington High School 8th grader; Lisa Dillmann, Manchester Elementary School 8th grader; and Susan Pratt, 8th grader from the Pownal Elementary School in the Bennington Southwest District.

The best of the cartoons are being displayed throughout the county. Newspapers have printed stories about the contest, giving the winners special recognition for their work, as well as due credit to all the pupils who took part in the conservation competition.

Conservation contests are not an educational end in themselves; but they have demonstrated that they can serve a definite function in the

Sister Ellen Therese, principal of St. Francis de Sales Academy, distributes cartoon contest material.

school program—as a teaching aid, as a roundup activity following the year-long study of conservation, or as an integrated part of a conservation teaching unit. Beneficial side effects have included stimulation on the part of parents and others in the community.

"We think the conservation cartoon contest has already done a great deal for conservation education in Bennington County," the committee reported. "As the idea grows in years to come, it should make quite an imprint on conservation in Bennington County."

The committee already is planning ways to increase participation next year. Advance letters to principals and standard sizes for the cartoon are among the new ideas.

A WOMAN'S WAY

In Conservation Education

By Milton E. Bliss

Margaret Black (right) explains glacial origins of Iowa soils to Drake University students, l. to r.: Karen Sachse, Marilyn Polich, and Sam Pugh.

ASSISTANT Professor of Science Education Margaret Black of Drake University explains the continuing popularity of her classes in conservation education as "the yeast in teaching conservation is a well planned field trip."

Over the past 22 years at Drake in Des Moines, Iowa, Miss Black has seen more than 2,000 of her students become interpreters of the outdoors to their pupils, families, and friends. Practicing what she preaches, Miss Black sees to it that her students get a good share of their training through field trips, Nature study groups, hiking clubs, conservation camps, and a Children's Forest.

She defines conservation as the "science of the outdoors, an approach to outdoor living, an appreciation of things in their natural environment, including the

Note:—The author is field information specialist, Soil Conservation Service, Milwaukee, Wis.

relationship of people to the world they live in.'' Probably one reason why Miss Black's classes in conservation are so popular is that they help would-be teachers overcome their fear of the world about them.

''Too many teachers are afraid of the outdoors,'' she points out. ''My job is to help them understand it better so they, in turn, can explain it to their students.''

Former students and other teachers from New York to Hawaii and the Philippines are using her methods and expounding her philosophy.

As a teacher at Callanan Junior High School in Des Moines during the 1930's, Miss Black often took her students outdoors after school hours and on Saturdays to explore the world of Nature about them. The Saturday trips, largely with Girl Scout troops, were giving the girls the edge in classwork.

''As a result,'' she recalls, ''the boys began to complain that the girls were getting too much extra attention.''

The outcome of this little jealousy was a request from school officials to review and revitalize the whole science education program in the Des Moines public school system. Miss Black was so successful in this undertaking that she was invited to become a member of the Drake faculty, where she has been since 1940.

''Anyone who works in conservation education must see the total conservation picture,'' is Miss Black's view. ''True conservation education aims to develop an appreciation of all resources—soil, water, minerals, people, parks, wildlife, wilderness, even space itself. Its main task is to enlarge the students' vision so they see the broad picture. Good conservation education exposes them to the geologic past, develops an appreciation of the resources that sustain us, and an understanding of the interdependence of people and their environment.''

Miss Black says she constantly has to correct the notion among teachers that ''conservation is the farmer's job,'' but she points out with satisfaction that ''teachers are better informed on conservation than administrators are.''

Fifth-graders of North Polk Community School, Elkhart, Iowa, admiring redbud tree they had just planted in Children's Forest.

''Good conservation teachers feel the need to spend more time with their students out of doors,'' she says. ''This feeling is growing to the point where school administrators will have to find an answer to the problems now posed by mass bus transportation, safety precautions, and conflicting or overlapping class schedules, because anything that so enriches the lives of young people ought not to be denied them.''

''I try to awaken them to an awareness of their involvement in decisions that relate to local conservation problems,'' she explains. ''Questions are the key, but I include, also, such things as a roll call with conservation news items and the making of books of clippings concerning current information about conservation as published in newspapers and magazines.''

But she says the crowning event in her career is the success she has had in developing the Children's Forest at Ewing Park, a 33-acre tract 8 miles southeast of Des Moines. Each year on the weekend closest to April 22, birthday of J. Sterling Morton, father of Arbor Day, groups of children from the Des Moines area plant trees of their own selection in the park. Anyone may participate, but children, especially, are encouraged to plant.

The project is an outgrowth of Miss Black's early teaching experience with Scout members, hiking clubs, and other youth groups interested in learning more about the outdoors. The members of the women's chapter of the Izaak Walton League of America are making further development of the forest their major project. A member of the women's chapter of the League, Miss Black is chairman and director of planting for the Children's Forest, among the numerous active and honorary memberships she holds in conservation and other organizations.

◆

Total average water supply in the United States is about 4,300 billion gallons a day; but about three-fourths of this supply is used by vegetation or is evaporated from the land.

From Backyard Garden To Conservation Truck Farm

By Marvin F. Bureau

AN Ohio high school science teacher and his bank-teller son capitalized on the son's vocational agriculture training and soil conservation technical help to parlay their backyard garden into one of the larger truck farms in Wayne County. They are Floyd and David Maurer, whose 44-acre strawberry and sweet corn farm had its beginnings a dozen years ago in Wooster.

Their interest in truck farming dates back to 1949, when David became a vo-ag student at Wooster High School. Their first venture, with 500 strawberry plants in their own backyard, was so successful that they added sweet corn and expanded to several neighboring backyards.

As a senior, in 1952, David received the State Farmer Award, a rare accomplishment for a non-farm boy. After graduating from Ohio State University in 1956, with a major in vegetable crops, he returned home to a job as teller and farm representative for a bank.

The Maurers then set out to buy suitable land to expand their part-time farming operation. Previous experience and David's college training made them keenly aware of the importance of selecting the right soil type and topography. A deep soil would be necessary. It should have good year-round internal drainage, yet not be too droughty. It should be at a high elevation on an east-facing slope for the least danger from frost.

Aware of their need for technical help, the Maurers turned to the Wayne County Soil and Water Conservation District. Soil survey maps at the Soil Conservation Service office helped them make a much faster and wiser decision in selecting the land they finally bought.

With SCS help available through the district, they developed an unique soil and water conservation plan for their acreage of choice Wooster silt loam soil. Their land has a gentle, but quite long slope; and erosion was a hazard. This danger was overcome by laying out 80-foot-wide contour strips for a 6-year rotation—2 years of strawberries and 1 year each of sweet corn with a ryegrass cover crop, sweet corn alone, wheat, and alfalfa-timothy meadow.

Father Floyd spraying strawberry plants.

The Maurers have found this cropping plan profitable and effective in controlling soil and water losses. They use all the wheat straw as a mulch for their strawberries, then plow it under. They leave a turnland that divides the contour strips evenly. This arrangement gives them the same annual crop acreage.

The Maurers drilled a well and put in a sprinkler irrigation system. This system serves not only to supply moisture at critical periods, but also protects the straw-

David Maurer makes sprinkler irrigation set in strawberries.

Note:—The author is soil scientist, Soil Conservation Service, Wooster, Ohio.

berries from frost when the plants are in the sensitive stage of flowering.

"In May 1961," David recalls, "we were especially thankful to have selected the right soil type for our operation. Several frost scares occurred when the berries were in full bloom, and it was necessary to turn the sprinklers on overnight. Rainfall had been heavy and the additional water could have caused waterlogging and serious damage to the berries if our soil hadn't had good internal drainage."

The real proof of their "shortcake," is the Maurers' production records. Strawberry yields have averaged a respectable 6,000 quarts an acre, with one patch producing 7,000 quarts an acre. Sweet corn yields recently topped 1,200 dozen ears to the acre, and have averaged 800 to 900. Their wheat has averaged 35 bushels an acre.

Strawberry plant sales also have become a big item with the Maurers since 1958, when they were registered to sell virus-free plants, which are considered by some horticulturalists to be among the best obtainable.

Thus conservation education is continuing to pay off for young David Maurer—and his Dad!

Conservation Increased Through Classroom Teaching

By Gene F. Bohnenblust and Daniel E. Holmes

LEARNING about the great out-of-doors in the classroom is bringing practical conservation results in Kansas public schools.

At McPherson, for example, a course in conservation and natural science is offered to the 12- to 15-year age group in the city schools. And in Harper County, as another example, the teaching of conservation in the schools has been reflected in increased soil and water conservation activities by the children's parents and neighbors.

This is a new field of education in the McPherson schools for the eighth grade pupils, whose attention is focused upon the natural environment of plants and animals around them—the role of fertile soils, clean water, plants, animals, and food in Nature's life cycle.

Farm-reared, locally knowledgeable John Colyn teaches the class, in addition to teaching a full schedule and general science classes. A graduate of McPherson College, he also has a Master's degree in biology from Kansas State Teachers College at Emporia, one of the State's leading institutions in teacher conservation training. His conservation class, the first such accredited class in Kansas schools, receives attention far beyond that of the usual class.

"We think our class is unique and definitely has a place in education today as we observe people being farther removed from Nature," Colyn said. "We seem to be heading toward the belief that blue prints and plans and numbers are the most important things in this

Instructor John Colyn (right) with the McPherson Intermediate School's conservation and natural science class.

Note:—The authors are work unit conservationists, McPherson and Anthony, Kans., both of the Soil Conservation Service.

A Saturday class project—cleaning land around a farm pond and planting multiflora rose on area for outdoor conservation laboratory.

world. We are forgetting that everything we have or ever will have comes from Nature."

The class had its beginning after the McPherson County Fish and Game Association launched a program aimed at improving and conserving wildlife resources. Colyn, former junior high school teacher, uses a three-phased approach. This includes a study of wildlife—birds, mammals, reptiles, fish, and other organisms; a study of wildlife environment, such as soil, water, food, and cover; and a study of the human factor in conservation. There was no textbook, so Colyn developed his own objectives, and planned classroom activities, field trips, and film lists.

Conservation specialists and others who have led classroom discussions and field trips have included everybody from a local nurseryman and former Forest Service official to the Soil Conservation Service work unit conservationist, and from the superintendent of the McPherson Public Utilities to a McPherson College biology professor. Films from the SCS, the Audubon Society, Forest Service, and others are shown.

Class members take many field trips to learn about conservation first hand. They have visited a fish hatchery, quail farm, a bird banding station, a wildlife refuge, and have studied soil and water conservation projects. Before a student can pass the conservation and natural science course, he must complete at least one project during the year. This may be building a bird house or some other activity for improving wildlife habitat.

Colyn encourages his students to bring animals to school. Along with many mounted birds and trophies in the classroom are a live one-winged great horned owl and a one-legged marsh hawk.

The pupils have returned their new conservation knowledge to the community. As one class project, for example, they have been converting a pond and small tract of land owned by McPherson College into a wildlife refuge. The pond, a favorite haunt for waterfowl and other game birds and wildlife, should be ready for fishing next season.

"Everyone's behind the class," is the way one mother summed up its success, "and there are no disciplining problems. This class toughens up adolescent girls who scream at the sight of snakes and worms. They learn that the world needs kindness rather than shallow showoffs."

The Harper County conservation teaching grew out of 4 years of drought, and the suggestion by a Harper County Soil Conservation District supervisor in 1956 that, somehow, farmers and city dwellers alike must be made to realize what erosion was doing to their farmlands and to their community. Another suggested that, in order to reach parents with the story, it would be necessary to interest their children first.

The history of conservation is taught as a unit of Kansas history, and pupils study conservation in their science classes throughout the year; but something more was needed to spark further interest in conservation for the children. The result was the start of a contest, which that fall produced 97 posters and 37 essays, from about 30 percent of the county's eligible children. Winners were announced at the district's annual meeting, for which students, parents, and teachers turned out.

Next, a half-day was set aside at the annual fall County Teacher Institute for the district supervisors to present a program on soil and water conservation. An annual "Soil and Water Conservation Week," proclaimed by the county superintendent of schools, followed, during which classes in all the schools see conservation movies, go on conservation tours, and watch demonstrations on conservation work.

The interest in the classroom is credited by the supervisors with a good measure of the increased conservation work now found on the land in Harper County. Applications for conservation farm planning help jumped from an average of 55 for the 3 years before 1956 to 125 in 1961.

Soil and water conservation kept pace. Terracing, grassed waterways, and erosion control dams doubled; and seeding of native pastures multiplied five times.

TV Brings Conservation Into Tennessee Classrooms

By Grace Batson

A FAINT click, a low hum, and several thousand boys and girls, seated at their classroom desks, visited areas with deep gullies and eroded canyons. They saw the dust bowl and the effects of rainfall on protected and unprotected farmland.

Charts, diagrams, and experiments helped the children understand just how soil and water conservation, or the lack of it, affects them right now. They were urged to check their schoolyards, homes, and playgrounds for erosion, and to try corrective measures where needed.

Again a faint click, the picture fades from a large TV screen, and the science lesson, featuring conservation, is over for the day. The TV lessons themselves, however, are just the beginning. The children are learning in a way that goes far beyond memorizing facts. They are learning how to use what they are learning.

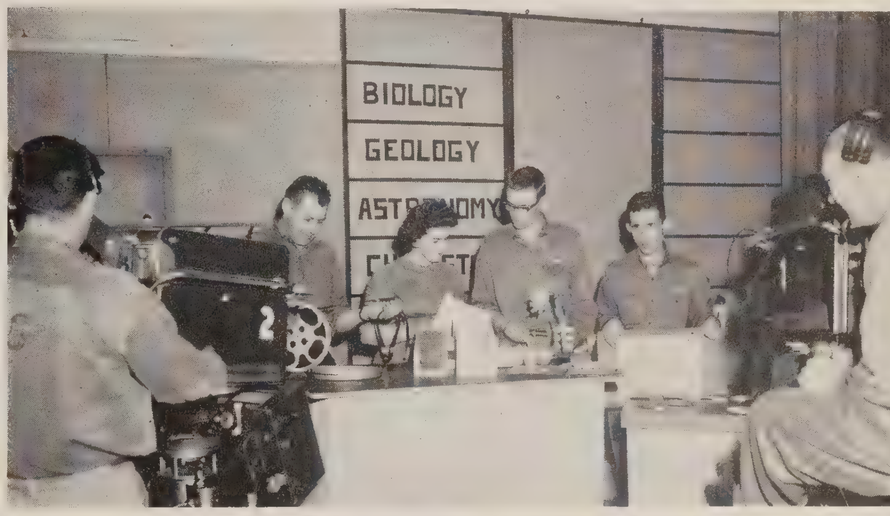
This and other typical lessons on conservation are a part of the experimental program of science teaching by TV that was started in 1960 by the Davidson County, Tenn., Board of Education, at the suggestion of County School Superintendent J. E. Moss.

Station WSM-TV agreed to give two 30-minute periods a week as a public service, and to tape the programs so the lessons might be rerun later. The sixth grade science series, ''Adventures in Science,'' was on its way! The two other local television stations, WSIX-TV and WLAC-TV, since have given equal science and other educational telecast time. A committee of teachers revised and broadened the science curriculum for all grade levels.

Helpful materials for the telecasts and classroom use are obtained from county, State, and Federal agencies. For example, the Soil Conservation Service has furnished film clips, colored slides, and photographs for telecasts, as well as bulletins for classroom use.

The advantages of teaching by TV are tremendous.

Nature study involves a lot of looking, often at very small objects. The TV lens can magnify many objects too small to be shown effectively in the classroom, such as a seed. Television can take all the children in a classroom to visit a



Cameras ready to roll as Director Dallas Thomas (2d from right) checks with TV Teacher Grace Batson.


This and other Tennessee conservation farming scenes have been brought into classrooms by TV.

Note:—The author is television teacher, Davidson County Board of Education, Nashville, Tenn.

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conservation farm, can let them take a walk in the woods and see a squirrel looking for food in its natural habitat, can show them a poisonous snake without danger. The magic screen can look into places that might not be open for class visits, because of distance, safety regulations, or expense.

At the beginning of the project, only Davidson County schools were intended to participate; but other school systems soon were writing or calling for permission to use the programs. Two years later, 33 other school systems, with about 25,000 viewing students, in surrounding counties used the programs and accompanying guides, plus adult and preschool viewers.

Television as an aid to conservation and other teaching in Tennessee will be extended still further this year. The Davidson County school system and the Nashville city school system have become joint owners of a new educational station; and in September WDCN-TV will go on the air with a schedule of programs for primary grades through high school.

A testing program carried on all year at the end of the first year showed that children with classroom teaching supplemented by television teaching were able to progress substantially further and faster than those with classroom teaching alone.

Our Job and Yours

Dr. George A. Selke.

"Nonfarm people must understand their own stake in conservation. They must realize that the preservation and conservation of any individual farmer's land is in reality conserving the Nation's basic capacity for agricultural production in the future. Hence an important objective of conservation education, as stated by the Federal Extension Service, is to 'encourage all people to accept, as citizens, a feeling of responsibility and concern for resource conservation to the extent that they contribute individual effort toward its accomplishment' . . . .

"Since its inception, SCS has responded to the needs of school people for information dealing with use and conservation of land resources. The importance of this work, similar to that of the Forest Service, is emphasized by the fact that today about 26 percent (or nearly 48 million) of our total population is in the classroom as students, teachers, administrators, or in other positions associated with the professional education field. Of this number, more than 15 million are school-age boys and girls who take part in the conservation activities of 4-H Clubs, Future Farmers of America, Boy Scouts, Camp Fire Girls, Girl Scouts, and Junior Audubon Clubs. . . .

"The Secretary of Agriculture is cognizant of the problems affecting land, water, forests, grasslands, and wildlife, and has a deep personal interest in conservation. We pledge our cooperation in the total conservation education job to be done, and we invite your cooperation. Conservation education is a job for all of us, working together."

—From an address by Dr. George A. Selke, Assistant to the Secretary of Agriculture.